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(71)出願人　000001007
キヤノン株式会社
東京都大田区下丸子３丁目30番２号
(72)発明者　真継　優和
東京都大田区下丸子３丁目30番２号キヤノン株式会社内
(72)発明者　近藤　俊明
東京都大田区下丸子３丁目30番２号キヤノン株式会社内
(74)代理人　100090284
弁理士　田中　常雄

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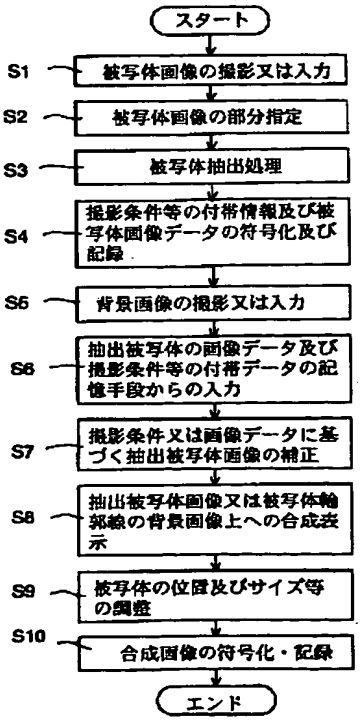
(54)【発明の名称】　画像処理装置及び方法並びに記憶媒体

(57)【要約】
【課題】　抽出した被写体を背景画像に合成する。
【解決手段】　ユーザは、抽出すべき被写体を含む画像を撮影し（Ｓ１）、指示選択装置２６などを用いて抽出範囲を指定し（Ｓ２）、被写体抽出回路により抽出する（Ｓ３）。抽出された被写体領域の画像データは圧縮符号化され、撮影条件とともに記憶装置に格納される（Ｓ４）。次に、背景画像を撮影又は入力する（Ｓ５）。背景画像を表示しながら、先に抽出した被写体画像を記憶装置から読み出す（Ｓ６）。背景画像と被写体画像との間の階調及び色調などの差異を抑制するように、被写体画像の階調及び色調を調整し（Ｓ７）、被写体の輪郭付近での背景画像との混合および平滑化を行って、被写体画像を背景画像に上書きする合成して、表示する（Ｓ８）。ユーザの指示に従い被写体画像の位置及びサイズを調整する（Ｓ９）。合成画像データを記録媒体に記録する（Ｓ１０）。



【特許請求の範囲】

【請求項１】　結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段と、

入力された画像の特定部分を指示選択するための指示選択手段と、

画像処理手段と、

画像符号化手段と、

画像記録手段と、

画像記録媒体と、

画像表示手段とを有し、前記画像処理手段は、入力された画像内の前記指示選択手段により指示選択された部分の画像情報を用いて前記画像内の特定被写体を抽出する特定被写体抽出手段と、前記記憶手段及び前記画像記録媒体の何れか一方に記憶された背景画像と抽出された前記特定被写体を合成する合成画像生成手段とを有することを特徴とする画像処理装置。

【請求項２】　結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制

御信号発生手段を含む画像入力手段と、

入力された画像の特定部分を指示選択するための指示選択手段と、

画像処理手段と、

画像符号化手段と、

画像記録手段と、

通信制御手段と、

画像記録媒体と、

画像表示手段とを有し、前記画像処理手段は、入力された画像内の前記指示選択手段により指示選択された部分の画像情報を用いて前記画像内の特定被写体を抽出する特定被写体抽出手段と、前記通信制御手段を介した背景画像の入力手段と、前記背景画像と抽出された前記特定被写体とを合成する合成画像生成手段とを有することを特徴とする画像処理装置。

【請求項３】　前記制御信号発生手段は、前記特定被写体の形状と位置に関する補助データを前記記憶手段から入力し、前記画像表示手段に前記補助データを表示する請求項１に記載の画像処理装置。

【請求項４】　前記制御信号発生手段は前記特定被写体の形状と位置に関する補助データを前記通信制御手段から入力し、前記画像表示手段に前記補助データを表示する請求項２に記載の画像処理装置。

【請求項５】　結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段と、

画像処理手段と、

画像フォーマット変換手段と、

画像符号化手段と、

画像記録手段と、

画像記録媒体と、

画像表示手段とを有し、前記画像フォーマット変換手段は前記記憶手段及び前記画像記録媒体の何れか一方に記憶された画像を所定のフォーマットに変換し、前記画像処理手段は、入力された画像内の特定被写体抽出処理を行い、抽出された特定被写体画像と前記画像フォーマット変換手段によりフォーマット変換された画像を合成することを特徴とする画像処理装置。

【請求項６】　結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段と、

画像処理手段と、

画像符号化手段と、

画像記録手段と、

画像記録媒体と、

画像表示手段とを有し、前記制御信号発生手段は撮影条件計測制御手段を有し、前記画像符号化手段は画像データを符号化し、符号化された画像データとともに前記撮影条件計測制御手段による撮影条件を前記記録媒体及び前記記憶手段の少なくとも一方に所定のフォーマットで記録し、前記画像処理手段は入力された画像内の特定被写体抽出処理を行い、抽出された特定被写体画像と前記記憶手段及び前記画像記録媒体の少なくとも一方に記録された画像を、前記撮影条件に基づき合成することを特徴とする画像処理装置。

【請求項７】　前記補助データは前記特定被写体に関する所定サイズの輪郭線及びマスクデータの何れかである請求項３又は４に記載の画像処理装置。

【請求項８】　前記補助データは所定形状の輪郭線である請求項３又は４に記載の画像処理装置。

【請求項９】　前記撮影条件は、露光量及びシャッタースピードの少なくとも一方、合焦量、撮影倍率、照明光の種類並びに視線方向を含む請求項６に記載の画像処理装置。

【請求項１０】　前記画像処理手段は、入力された画像の撮影時の撮影条件と前記背景画像の撮影条件との差異に基づき、一方の画像が他方の画像の撮影条件と略一致する様に、一方の画像の、少なくとも一部の領域に対して所定の変換処理を行った後、画像の合成処理を行う請求項１、２、５又は６に記載の画像処理装置。

【請求項１１】　前記制御信号発生手段は、前記特定被写体の形状と位置に関する補助データを前記記憶手段から入力し、該補助データの形状及び位置を前記撮影条件に基づいて変化させる請求項６に記載の画像処理装置。

【請求項１２】　所定の画像入力手段から画像を入力するステップと、

入力された画像の画像入力条件の計測または設定ステップと、

前記画像入力条件を所定の記憶手段に記録するステップと、

入力された画像から特定被写体を抽出する被写体抽出ス

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テップと、
前記画像入力条件に基づいて該抽出された被写体の画像と所定の記憶手段に記録された背最画像との合成画像の生成処理を行う画像合成ステップと、
前記合成画像の所定記憶手段へ所定フォーマットによる記録または所定表示手段への出力を行う画像出力制御手段ステップとからなることを特徴とする画像処理方法。
【請求項１３】　所定の画像入力手段から画像を入力するステップと、
入力された画像の画像入力条件の計測または設定ステップと、
前記画像入力条件を所定の記憶手段に記録するステップと、
入力された画像から特定被写体を抽出する被写体抽出ステップと、
前記画像入力条件に基づいて、抽出された被写体の画像と所定の記憶手段に記録された背景画像とを合成する画像合成ステップと、
前記画像合成ステップにより得られた合成画像の所定記憶手段及び記録媒体の少なくとも一方への所定フォーマットによる記録、または所定表示手段への出力を行う画像出力制御手段ステップ
とからなる処理手順のプログラム・ソフトウエアを記憶することを特徴とする記録媒体。
【請求項１４】　結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段と、
画像処理手段と、
画像符号化手段と、
画像記録手段と、
画像記録媒体と、
画像表示手段とを有し、前記画像処理手段は前記記録媒体及び前記記憶手段の一方に記録された第１画像データと前記画像入力手段により入力された第２画像とを、前記第２画像の画像入力条件及び前記第１画像の画像入力条件の少なくとも一方を用いて合成し、前記制御信号発生手段は、前記画像処理手段により得られる合成画像を前記画像表示手段に表示する制御信号を発生することを特徴とする画像処理装置。
【請求項１５】　所定の画像入力手段から画像を入力するステップと、
所定の記憶手段及び画像記録媒体の一方に記録された第１画像の所定表示手段への表示及び選択ステップと、
選択された第１画像と入力画像を合成する画像合成ステップと、
前記画像合成ステップで得られる合成画像の所定記憶手段への所定フォーマットによる記録、または所定表示手段への出力を行う画像出力制御手段ステップとからなることを特徴とする画像処理方法。
【請求項１６】　所定の画像入力手段から画像を入力

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するステップと、
所定の記憶手段及び画像記録媒体の一方に記録された第１画像の所定表示手段への表示及び選択ステップと、
選択された第１画像と入力画像を合成する画像合成ステップと、
前記画像合成ステップで得られる合成画像の所定記憶手段への所定フォーマットによる記録、または所定表示手段への出力を行う画像出力制御手段ステップとからなる処理手順のプログラム・ソフトウエアを記憶する記録媒体。
【請求項１７】　画像入力手段と、
前記画像入力手段により入力された第１画像を表示する画像表示手段と、
前記第１画像の所望の部分を指示選択する指示選択手段、
前記第１画像内で前記指示選択手段により指示選択された部分の画像情報を用いて、前記入力画像内の特定領域を抽出する特定領域抽出手段と、
前記特定領域抽出手段により抽出され前記特定領域の画像を、第２の画像と合成する画像合成手段とを具備することを特徴とする画像処理装置。
【請求項１８】　前記画像入力手段が、結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む請求項１７に記載の画像処理装置。
【請求項１９】　前記画像入力手段が、通信媒体を介して画像を取り込む通信手段を具備する請求項１７に記載の画像処理装置。
【請求項２０】　前記通信媒体からの画像データのフォーマットを所定のフォーマットに変換するフォーマット変換手段を具備する請求項１９に記載の画像処理装置。
【請求項２１】　更に、前記画像表示手段により表示される前記第１の画像上に、抽出したい前記特定領域の指定を補助する補助線図を表示させる補助表示手段を具備する請求項１７に記載の画像処理装置。
【請求項２２】　前記補助線図は、抽出したい前記特定領域を示す所定サイズの輪郭線である請求項２１に記載の画像処理装置。
【請求項２３】　前記補助線図は、抽出したい前記特定領域を示すマスクデータに従って描画される請求項２１に記載の画像処理装置。
【請求項２４】　前記画像入力手段が、前記第１画像と共にその撮影条件を入力し、前記画像合成手段が、前記特定領域抽出手段により抽出され前記特定領域の画像を前記撮影条件に従い調整して第２の画像と合成する請求項１７に記載の画像処理装置。
【請求項２５】　前記撮影条件は、露光量、合焦量、撮影倍率、照明光の種類及び視線方向の何れか１つを含む請求項２４に記載の画像処理装置。
【請求項２６】　前記画像合成手段は、前記第１画像の撮影条件と前記第２画像の撮影条件との差異に基づき、

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一方の画像が他方の画像の撮影条件と略一致するように一方の画像の、少なくとも一部の領域に対して所定の変換処理を行った後、画像の合成処理を行う請求項１７又は２４に記載の画像処理装置。

【請求項２７】　更に、前記第１画像から抽出した特定被写体の形状と位置に関する補助データを記憶する補助データ記憶手段と、前記第１画像の撮影条件に従い、前記補助データ記憶手段に記憶される補助データの位置とサイズを変化させる補助データ補正手段と、前記画像表示手段により表示される前記第１の画像上に、前記補助データ補正手段により補正された補助データに基づく補助線図を表示させる補助表示手段を具備する請求項１７に記載の画像処理装置。

【請求項２８】　所定の画像入力手段から画像を入力する画像入力ステップと、
入力された画像の画像入力条件を計測又は設定する計測設定ステップと、
前記画像入力条件を所定の記憶手段に記憶する入力条件記憶ステップと、
入力された画像から特定被写体を抽出する被写体抽出ステップと、
前記画像入力条件に基づいて、前記被写体抽出ステップで抽出された被写体の画像と所定の記憶手段に記録された背最画像とを合成する画像合成ステップと、
前記画像合成ステップで得られた合成画像を出力する合成画像出力ステップとからなることを特徴とする画像処理方法。

【請求項２９】　前記合成画像出力ステップが、前記合成画像を記録媒体に記録するステップである請求項２８に記載の画像処理方法。

【請求項３０】　請求項２８に記載の画像処理方法を実行するプログラム・ソフトウエアを外部読み出し自在に記憶することを特徴とする記憶媒体。

【請求項３１】　結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段、画像処理手段、画像符号化手段、画像記録手段、画像記録媒体並びに画像表示手段を有し、前記画像処理手段は前記記録媒体及び前記記憶手段の何れか一方に記録された第１画像データと前記画像入力手段により入力された第２画像とを、前記第２画像の画像入力条件及び前記第１画像の画像入力条件の少なくとも一つを用いて合成し、前記制御信号発生手段は、前記画像表示手段に前記画像処理手段により得られた合成画像を表示する制御信号を発生することを特徴とする画像処理装置。

【請求項３２】　所定の画像入力手段から画像を入力するステップ、所定の記憶手段及び画像記録媒体の何れか一方に記録された第１画像の所定表示手段への表示及び選択ステップ、前記選択された第１画像と入力画像を合成する画像合成ステップ、並びに、前記画像合成ステップによる合成画像の所定記憶手段へ所定フォーマットによる記録または所定表示手段への出力を行う画像出力ステップからなることを特徴とする画像処理方法。

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【請求項３３】　請求項３２に記載の画像処理方法を実行するプログラム・ソフトウエアを外部読み出し自在に記憶することを特徴とする記憶媒体。

【請求項３４】　画像入力手段と、
撮像条件抽出手段と、
画像変換モード設定手段と、
入力画像から当該撮像条件を用いて所定の対象領域を求める領域抽出手段と、
当該入力画像のうち当該対象領域の画像に所定の変換を施す画像変換手段とを具備することを特徴とする画像処理装置。

【請求項３５】　画像入力手段と、
画像表示手段と、
撮像条件抽出手段と、
画像変換モード設定手段と、
入力画像から当該画像変換モード又は当該撮像条件に基づき所定の対象領域を設定する領域設定手段と、
設定領域の境界線を入力画像に重畳して当該画像表示手段に表示する境界線表示手段と、
当該入力画像のうち当該対象領域又は当該対象領域を除いた背景領域の画像に所定の変換を施す画像変換手段とを具備することを特徴とする画像処理装置。

【請求項３６】　画像入力手段と、
撮像条件抽出手段と、
画像変換モード設定手段と、
当該撮像条件又は当該画像変換モードに基づいて入力画像から所定の対象領域を求める領域抽出手段と、
当該入力画像のうち当該対象領域又は当該対象領域を除いた背景領域の画像に所定の変換を施す画像変換手段とを具備することを特徴とする画像処理装置。

【請求項３７】　前記画像変換手段は前記対象領域に前記撮像条件又は前記画像変換モードに基づき所定のテクスチャマッピング処理を施すことを特徴とする請求項３４、３５又は３６に記載の画像処理装置。

【請求項３８】　前記画像変換手段は所定の記憶手段から他の画像を入力し、前記対象領域を前記撮像条件又は前記画像変換モードに基づき当該他の画像で置換することを特徴とする請求項３４、３５又は３６に記載の画像処理装置。

【請求項３９】　前記画像変換手段は前記対象領域の特定色成分を他の色成分に変換することを特徴とする請求項３４、３５又は３６に記載の画像処理装置。

【請求項４０】　前記画像変換手段は前記対象領域に所定の幾何学的変形を施すことを特徴とする請求項３４、３５又は３６に記載の画像処理装置。

【請求項４１】　前記画像変換手段は変換後の画像データに所定の透かし情報を付加することを特徴とする請求項３４、３５又は３６に記載の画像処理装置。

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【請求項４２】　前記領域抽出手段は予め入力された背景画像と前記入力画像との差分データに基づき前記対象領域を求めることを特徴とする請求項３４又は３６に記載の画像処理装置。

【請求項４３】　前記領域抽出手段は所定のテンプレートモデル画像の記憶手段、当該テンプレートモデルと前記入力画像との類似度検出手段、当該類似度が所定閾値以上又は極大となる領域を抽出する領域抽出手段とを具備することを特徴とする請求項３４又は３６に記載の画像処理装置。

【請求項４４】　前記画像変換手段は前記対象領域又は前記背景領域の一部について撮像条件に基づき輝度レベル、又は色成分値を変換することを特徴とする請求項３４、３５又は３６に記載の画像処理装置。

【請求項４５】　前記領域抽出手段は抽出領域の境界線を入力画像に重畳して前記画像表示手段に表示することを特徴とする請求項３４又は３６に記載の画像処理装置。

【請求項４６】　前記領域設定手段は当該領域の位置又はサイズ変更手段を有することを特徴とする請求項３５に記載の画像処理装置。

【請求項４７】　前記領域抽出手段は前記撮像条件に基づいて前記テンプレートモデル画像の前記入力画像中の位置とサイズを設定し、当該設定されたテンプレートモデル画像の輪郭線を初期輪郭として前記対象領域の輪郭線を求めることを特徴とする請求項４３に記載の画像処理装置。

【請求項４８】　前記輪郭線表示手段は所定の表示選択手段により輪郭線の表示動作が選択されたときに前記境界線を表示することを特徴とする請求項３５に記載の画像処理装置。

【請求項４９】　画像入力ステップと、
撮像条件抽出ステップと、
画像変換モード設定ステップと、
入力画像から当該撮像条件を用いて所定の対象領域を求める領域抽出ステップと、
当該入力画像のうち当該対象領域の画像に所定の変換を施す画像変換ステップとを具備することを特徴とする画像処理方法。

【請求項５０】　画像入力ステップと、
撮像条件抽出ステップと、
画像変換モード設定ステップと、
入力画像から当該画像変換モード又は当該撮像条件に基づき所定の対象領域を設定する領域設定ステップと、
設定領域の境界線を入力画像に重畳して画像表示手段の画面上に表示する境界線表示ステップと、
当該入力画像のうち当該対象領域又は当該対象領域を除いた背景領域の画像に所定の変換を施す画像変換ステップとを具備することを特徴とする画像処理方法。

【請求項５１】　画像入力ステップと、

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撮像条件抽出ステップと、
画像変換モード設定ステップと、
当該撮像条件又は当該画像変換モードに基づいて入力画像から所定の対象領域を求める領域抽出ステップと、
当該入力画像のうち当該対象領域又は当該対象領域を除いた背景領域の画像に所定の変換を施す画像変換ステップとを具備することを特徴とする画像処理方法。

【請求項５２】　前記画像変換ステップは前記対象領域に前記撮像条件又は前記画像変換モードに基づき所定のテクスチャマッピング処理を施すことを特徴とする請求項４９、５０又は５１に記載の画像処理方法。

【請求項５３】　前記画像変換ステップは所定の記憶手段から他の画像を入力し、前記対象領域を前記撮像条件又は前記画像変換モードに基づき当該他の画像で置換することを特徴とする請求項４９、５０又は５１に記載の画像処理方法。

【請求項５４】　前記画像変換ステップは前記対象領域の特定色成分を他の色成分に変換することを特徴とする請求項４９、５０又は５１に記載の画像処理方法。

【請求項５５】　前記画像変換ステップは前記対象領域に所定の幾何学的変形を施すことを特徴とする請求項４９、５０又は５１に記載の画像処理方法。

【請求項５６】　前記画像変換ステップは変換後の画像データに所定の透かし情報を付加することを特徴とする請求項４９、５０又は５１に記載の画像処理方法。

【請求項５７】　前記領域抽出ステップは予め入力された背景画像と前記入力画像との差分データに基づき前記対象領域を求めることを特徴とする請求項４９又は５１に記載の画像処理方法。

【請求項５８】　前記領域抽出ステップは、記憶手段に記憶されるテンプレートモデルと前記入力画像との類似度を検出する類似度検出ステップ、当該類似度が所定閾値以上又は極大となる領域を抽出する領域抽出ステップとを具備することを特徴とする請求項４９又は５１に記載の画像処理方法。

【請求項５９】　前記画像変換ステップは前記対象領域又は前記背景領域の一部について撮像条件に基づき輝度レベル又は色成分値を変換することを特徴とする請求項３４、３５又は３６に記載の画像処理方法。

【請求項６０】　前記領域抽出ステップは抽出領域の境界線を入力画像に重畳して前記画像表示手段に表示することを特徴とする請求項４９又は５０に記載の画像処理方法。

【請求項６１】　前記領域設定ステップは当該領域の位置又はサイズを変更するステップを有することを特徴とする請求項５０に記載の画像処理方法。

【請求項６２】　前記領域抽出ステップは前記撮像条件に基づいて前記テンプレートモデル画像の前記入力画像中の位置とサイズを設定し、当該設定されたテンプレートモデル画像の輪郭線を初期輪郭として前記対象領域の

輪郭線を求めることを特徴とする請求項５８に記載の画像処理方法。

【請求項６３】　前記輪郭線表示ステップは所定の表示選択手段により輪郭線の表示動作が選択されたときに前記境界線を表示することを特徴とする請求項５０に記載の画像処理方法。

【請求項６４】　請求項４９に記載の画像処理方法を実行するプログラム・ソフトウエアを記憶することを特徴とする記憶媒体。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、被写体切り出し及び画像合成機能を有する画像処理装置及び方法並びに記憶媒体に関する。

【０００２】

【従来の技術】従来、撮像装置では、信号処理のディジタル化に伴って映像情報の処理加工の自由度が向上するに従い、装置内部で、輝度レベルまたは色調の変換、色バランス調整及び量子化サイズ変換などの比較的簡易な処理から、エッジ抽出機能、及び色成分の逐次成長法を用いた被写体抽出機能（テレビジョン学会技術報告、Ｖｏｌ．１８、ｐｐ．１３～１８、１９９４年）を有するものなど、画像処理機能を付加したものが種々、提案されている。

【０００３】また、背景画像との差分に基づいて画像を抽出する方法において、背景画像の撮像時に平均輝度が適正となるように露光量を制御した上で、背景画像と同じ設定値を用いて原画像を撮像した後、それらの差分データに基づき対象画像を抽出する構成が知られている（例えば、特開平６－２５３１９７号公報参照）。

【０００４】入力画像から特定領域と他の領域に異なる処理を施す画像伝送又は撮像技術として、以下に示す技術が知られる。例えば、特定対象領域の抽出手段を有し、入力画像から人物などの特定対象の領域の画像データと背景となる部分の画像データとで、その符号化特性又は伝送特性（特定領域の伝送の有無を含む。）等を異ならせる技術が、特開平５－１４５９１４号公報、特開平５－３３６３７４号公報、特開平６－３１９１３０号公報、特開平７－２２２０４８号公報、特開平７－２３０５５４号公報及び特開平７－２５０３１２号公報に記載されている。

【０００５】また、画像から複数の領域を切り出し、それらを任意の配置で合成する手段を備えた映像伝送装置が、特開平７－２９８２３８号公報に記載され、被写体抽出手段、被写体と背景についての信号処理パラメータ制御手段又は加工回路及び置換回路を有する装置が、特開平５－１１０９３６号公報、特開平６－１６９４２５号公報、特開６－２２５３２８号公報及び特開平８－１５４２５９号公報に記載されている。

【０００６】

【発明が解決しようとする課題】被写体抽出機能を有する従来の画像処理装置は、特定撮影条件下での被写体を分離抽出することを目的とするので、一般的な背景で被写体を抽出することが困難であるという問題点のほか、別途用意された背景との画像合成などの画像の編集加工処理を行う際に、以下のような問題があった。即ち、分離抽出した被写体の姿態が背景画像の構図などと合うかどうかは、撮影時には判断できず、合成時でないと分からない。また、ユーザが別途用意した背景画像と抽出された被写体画像との間で、撮影条件、例えば照明条件、露光条件、倍率及び合焦度などが異なると、非常に不自然且つ違和感のある合成画像となり、時に色調の変換又は階調補正などの処理を加える必要が生じる。

【０００７】本発明は、このような不都合を解消した画像処理装置及び方法並びに記憶媒体を提示することを目的とする。

【０００８】特開平５－１４５９１４号公報等に記載の従来例は、撮像システム又は画像伝送システムにおいて符号化効率を上げることを目的とするものあり、画像の一部を加工しようとするものではない。

【０００９】特開平７－２９８２３８号公報に記載される従来例は、画像中の矩形領域を抽出して合成するものであり、任意形状の被写体部分等に特化した処理ができない。

【００１０】特開平５－１１０９３６号公報及び特開平６－２２５３２８号公報に記載される従来例は、輝度、色相又は色差の範囲を抽出条件として設定し、この条件を満たす部分を被写体とみなすので、任意の背景色と被写体との組み合わせでは、所望の被写体領域を抽出して加工処理することができない。

【００１１】特開平６－１６９４２５号公報に記載されるビデオカメラでは、ビューファインダの表示画面中の所定位置に被写体の映像と重畳してマーカを表示し、マーカが位置する被写体部分の映像信号の色又は輝度レベルに基づき被写体を抽出するが、ユーザは、マーカと所望の被写体とが重なるように画角を調整して撮影する必要があり、非常に面倒で、操作性が悪く、従って、被写体の抽出精度も悪い。

【００１２】特開平８－１５４２５９号公報は、人物の肌色を計測することにより人物の存在領域を推定し、その人物像を抽出するものであり、汎用性に欠けている。

【００１３】このように、従来例では、画像中の任意形状又は任意の配色を有する主被写体又は背景に所定のぼかし又は変形を加えるなどの画像加工を自動的又は簡易な操作で半自動的に行うことは困難であった。

【００１４】本発明は、このような不都合を解消する画像処理装置及び方法並びに記憶媒体を提示することを目的とする。

【００１５】本発明はまた、画像中の任意形状又は任意の配色を有する主被写体又は背景に所定のぼかし又は変

形を加えるなどの画像加工を自動的又は半自動的に行うことを可能にする画像処理装置及び方法並びに記憶媒体を提示することを目的とする。

【００１６】

【課題を解決するための手段】本発明に係る画像処理装置は、結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段、入力された画像の特定部分を指示選択するための指示選択手段、画像処理手段、画像符号化手段、画像記録手段、画像記録媒体並びに画像表示手段を有し、画像処理手段は入力された画像内の指示選択手段により指示選択された部分の画像情報を用いて画像内の特定被写体を抽出する特定被写体抽出手段と、記憶手段または画像記録媒体に記憶された背景画像と抽出された該特定被写体を合成する合成画像生成手段とを有することを特徴とする。

【００１７】これにより、任意の背景を含む被写体画像を入力（撮影）して、その中の被写体を抽出したうえで被写体画像中の背景と異なる背景画像と被写体との合成画像の生成を行うことが簡易な操作により実現できる。また合成された画像を画像表示手段に表示することにより、合成画像中の被写体の位置や大きさを確認することができ、更に指示選択手段によりそれらを調整して背景と適切なマッチングを取ったうえで合成画像を記録、保存、または出力することができる。

【００１８】本発明に係る画像処理装置は、結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段、入力された画像の特定部分を指示選択するための指示選択手段、画像処理手段、画像符号化手段、画像記録手段、通信制御手段、画像記録媒体並びに画像表示手段を有し、画像処理手段は入力された画像内の指示選択手段により指示選択された部分の画像情報を用いて画像内の特定被写体を抽出する特定被写体抽出手段と、通信制御手段を介した背景画像の入力手段と、背景画像と抽出された特定被写体を合成する合成画像生成手段とを有することを特徴とする。

【００１９】これにより、上記特徴に加えて背景画像を外部から入力し、背最画像と任意の背景を含む被写体画像中の被写体との合成が簡易な操作により実現できる。

【００２０】本発明において、制御信号発生手段は特定被写体の形状と位置に関する補助データを記憶手段から入力し、画像表示手段に補助データを表示することを特徴とする。これにより、予め被写体の形状または姿態及び位置などが概ね定まっている場合に、そのデータ（例えば、矩形枠又は同じタイプの被写体モデルの輪郭線など）を入力して入力画像に重ねて表示することにより、撮影などの画像入力の現場においてその補助データに適合するように被写体画像中の被写体の姿勢などを調整できる場合には、指示選択手段による被写体抽出のための画像の部分指定を行わずに被体抽出が実行可能となる。

【００２１】本発明において、制御信号発生手段は特定

被写体の形状と位置に関する補助データを通信制御手段から入力し、画像表示手段に補助データを表示することを特徴とする。これにより、前記特徴に加えて補助データを撮像画像処理手段の外部から入力することができる。

【００２２】本発明に係る画像処理装置は、結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段、画像処理手段、画像フォーマット変換手段を有する画像符号化手段、画像記録手段、画像記録媒体並びに画像表示手段を有し、画像符号化手段内の画像フォーマット変換手段は、記憶手段または画像記録媒体に記憶された画像を所定のフォーマットに変換し、画像符号化手段は記憶手段または画像記録媒体に記録された所定の画像データのフォーマットを変換し、画像処理手段は、入力された画像内の特定被写体抽出処理を行い、抽出された特定被写体画像と画像フォーマット変換手段によりフォーマット変換された画像を画像合成することを特徴とする。

【００２３】これにより、前述した特徴を有する被写体抽出と画像合成処理機能を備えた画像処理手段において、内部に画像合成処理のために適切なフォーマットへの変換処理手段を内蔵したので、入力される画像データのフォーマットの選択範囲を大幅に広げることができる。

【００２４】本発明に係る画像処理装置は、結像光学系、光電変換手段、映像信号処理手段、記憶手段及び制御信号発生手段を含む画像入力手段、画像処理手段、画像符号化手段、画像記録手段、画像記録媒体並びに画像表示手段を有し、制御信号発生手段は撮影条件計測制御手段を有し、画像符号化手段は画像データを符号化し、符号化された画像データとともに撮影条件を記録媒体または記憶手段に所定のフォーマットで記録し、画像処理手段は入力された画像内の特定被写体抽出処理を行い、抽出された特定被写体と記憶手段または画像記録媒体に記録された（背景）画像とを、撮影条件に基づいて合成することを特徴とする。

【００２５】これにより、撮影条件に基づいて階調変換などを行った上で、抽出された被写体の画像と背景画像の撮影条件の違いをなくした自然な合成画像が自動的に得られる。

【００２６】本発明において、補助データは、特定被写体に関する所定サイズの輪郭線またはマスクデータであることを特徴とする。これにより被写体形状が概ね定まっている場合には、その輪郭線またはその内部領域を入力画像に重ねて表示（着色等の特殊表示）することにより、画像入力（撮影）の現場で補助データに適合した被写体の姿勢又は姿態などを得て補助輪郭線内部の領域を抽出することにより被写体抽出を自動的に行うことができる。更に、背景画像と被写体画像の背景とがほぼ一致する場合には、被写体抽出の精度が大幅に向上する。

【００２７】本発明において、補助データは、所定形状の閉輪郭線であることを特徴とする。被写体の形状を近似していなくても、その縦横サイズを反映した矩形または楕円などの閉輪郭線によって与えられるごく大まかな形状により被写体領域を指定することにより、前述したように背景画像と被写体画像の背景とがほぼ一致する場合には被写体抽出の精度が大幅に向上する。

【００２８】本発明において、撮影条件は、露光量またはシャッタースピード、合焦量、撮影倍率、照明光の種類及び視線方向を含むことを特徴とする。被写体画像と背景画像との間でこれらの撮影条件の違いを吸収して自然な合成画像が得られるようにするためである。なお、視線方向は単に被写体の存在する領域の指定などに用いる。

【００２９】本発明において、画像処理手段は、入力された画像の撮影時の撮影条件と背景画像の撮影条件との差異に基づき、一方の画像が他方の画像の撮影条件と略一致する様に一方の画像の少なくとも一部の領域に対して所定の変換処理を行った後、画像の合成処理を実行する。これにより、撮影条件に基づいて一方の画像の階調、色調、コントラスト又は鮮鋭度などを変換して他方の画像と合成した時に自然な画像が得られるようにすることができる。

【００３０】本発明において、制御信号発生手段は、特定被写体の形状と位置に関する補助データを記憶手段から入力し、補助データの形状または位置を撮影条件に基づいて変化させることを特徴とする。これにより、背景画像を入力（撮影）した時の撮影条件（倍率、照明条件及び露光条件など）と被写体画像の入力時の撮影条件とが異なる場合、或いは変化する場合でも、入力画像の撮影条件に応じて自動的に補助データの特徴（輪郭線の形状、コントラストなど）を適正に変化させることができるので、その後の被写体抽出処理を簡略化して行うことができる。

【００３１】本発明に係る画像処理方法は、所定の画像入力手段から画像を入力するステップ、入力された画像の画像入力条件の計測または設定ステップ、画像入力条件を所定の記憶手段に記録するステップ、入力された画像から特定被写体の抽出を行う被写体抽出ステップ、画像入力条件に基づいて抽出された被写体の画像と所定の記憶手段に記録された背景画像を合成する画像合成ステップ、画像合成ステップで得られた合成画像の所定記憶手段への所定フォーマットによる記録または所定表示手段への出力を行う画像出力制御手段ステップとからなることを特徴とする。

【００３２】これにより、画像入力条件の違いや変動に関わらず、所定の入力画像中の特定被写体と背景画像との画像合成を自然なものにできる。また、その処理手順に従う限り、機器構成によらずに安定した画像合成が可能になる。

【００３３】本発明は、画像入力手段又はステップと、撮像条件抽出手段又はステップと、画像変換モード設定手段又はステップと、入力画像から撮像条件を用いて所定の対象領域を求める領域抽出手段又はステップと、入力画像のうち対象領域又は対象領域を除いた背景領域の画像に所定の変換を施す画像変換手段又はステップとを具備することを特徴とする。これにより、被写体の部分形状を撮像条件などから確実に特定することができ、所望の変換を加えて撮像することのできる撮像装置又は画像入力装置を実現できる。

【００３４】本発明は、画像入力手段と、画像表示手段と、撮像条件抽出手段と、画像変換モード設定手段と、入力画像から当該画像変換モード又は当該撮像条件に基づき所定の対象領域を設定する領域設定手段と、設定領域の境界線を入力画像に重畳して画像表示手段に表示する境界線表示手段と、入力画像のうち対象領域又は対象領域を除いた背景領域の画像に所定の変換を施す画像変換手段とを具備することを特徴とする。本発明は、画像入力ステップと、撮像条件抽出ステップと、画像変換モード設定ステップと、入力画像から当該画像変換モード又は当該撮像条件に基づき所定の対象領域を設定する領域設定ステップと、設定領域の境界線を入力画像に重畳して画像表示手段に表示する境界線表示ステップと、入力画像のうち対象領域又は対象領域を除いた背景領域の画像に所定の変換を施す画像変換ステップとを具備することを特徴とする。これにより、被写体に応じた変換領域の設定を自動的に行うことができ、またユーザが設定された領域を視認したうえで該当する領域において被写体が変換されるような撮影、又は変換後の映像を確認することが出来る画像入力を実現する。

【００３５】また本発明は、画像入力手段又はステップと、撮像条件抽出手段又はステップと、画像変換モード設定手段又はステップと、当該撮像条件又は当該画像変換モードに基づいて入力画像から所定の対象領域を求める領域抽出手段又はステップと、入力画像のうち対象領域又は対象領域を除いた背景領域の画像に所定の変換を施す画像変換手段又はステップとを具備することを特徴とする。これにより、被写体の領域を撮像条件等に基づいて画像から自動的に抽出することができ、且つ、その抽出領域に対して所望の変換を施した上で画像入力することができる。

【００３６】本発明において、画像変換手段又はステップは対象領域に撮像条件又は画像変換モードに基づき所定のテクスチャマッピング処理を施すことを特徴とする。また、画像変換手段は、所定の記憶手段から他の画像を入力し、対象領域を撮像条件又は画像変換モードに基づき他の画像で変換することを特徴とする。これらにより、撮像条件又は画像変換モードに応じた特定領域の変換を行うことのできる画像入力手段を提供する。

【００３７】また、画像変換手段又はステップは、対象

領域の特定色成分を他の色成分に変換することを特徴とする。これにより、撮像条件などを用いて特定された対象領域の色成分を自動的に変換することのできる画像入力手段を実現できる。

【００３８】本発明において、画像変換手段又はステップは対象領域に所定の幾何学的変形を施すことを特徴とする。これにより、撮像条件などを用いて特定された対象領域にアフィン変換などの幾何学的変形を加えることができる画像入力手段を実現できる。

【００３９】本発明において、画像変換手段又はステップは変換後の画像データに所定の透かし情報を付加することを特徴とする。これにより、変換部分の領域及び変換モードなどの情報を画像とともに視覚的に知覚されないように記録することができる。更に、これらの情報に基づいて変換前の画像を復元するなどの後処理が簡易に実行できる。

【００４０】本発明において、領域抽出手段又はステップは予め入力された背景画像と入力画像との差分データに基づき対象領域を求めることを特徴とする。これにより、自動的に変換対象の領域を特定することができる。

【００４１】本発明において、領域抽出手段は、所定のテンプレートモデル画像の記憶手段と、テンプレートモデルと入力画像との類似度検出手段と、類似度が所定閾値以下又は極大となる領域を抽出する領域抽出手段とを具備することを特徴とする。領域抽出ステップは、記憶手段に記憶されるテンプレートモデルと入力画像との類似度を検出する類似度検出ステップと、類似度が所定閾値以下又は極大となる領域を抽出する領域抽出ステップとを具備することを特徴とする。これにより、撮像条件などを用いてテンプレートサイズを適切に変換するとともに、テンプレート形状と類似度の高い領域として変換対象の領域を自動的に特定することができる画像入力装置を実現できる。

【００４２】本発明において、画像変換手段又はステップは、対象領域又は背景領域の一部について撮像条件に基づき輝度レベル又は色成分値の変換を行うことを特徴とする。これにより、変換対象として特定された領域の中で予め変換すべき部分を特定して画像変換することのできる画像入力装置を実現できる。

【００４３】本発明において、領域抽出手段又はステップは、抽出領域の境界線を入力画像に重畳して前記画像表示手段に表示することを特徴とする。これにより、ユーザは抽出された領域の範囲を確認したうえで画像変換撮影を行うことができる。

【００４４】本発明において、領域設定手段又はステップは領域の位置又はサイズ変更手段を有することを特徴とする。これにより、設定された変換領域の位置又はサイズを簡易に調整することができる変換撮影を行うことができる。

【００４５】本発明において、領域抽出手段又はステップは撮像条件に基づいてテンプレートモデル画像の入力画像中の位置とサイズを設定し、設定されたテンプレートモデル画像の輪郭線を初期輪郭として対象領域の輪郭線を求めることを特徴とする。これにより、テンプレートモデルで指定される形状と多少異なる輪郭線を有する被写体であっても、正しい輪郭線内部の領域について画像変換を自動的に実行することができる変換撮影が可能となる。

【００４６】本発明において、輪郭線表示手段又はステップは所定の表示選択手段により輪郭線の表示動作が選択されたときにその輪郭線を表示することを特徴とする。これにより、通常撮影モードから変換撮影モードへの変換（又はその逆）、変換対象の確認などを行うことができる。

【００４７】

【実施例】以下、図面を参照して、本発明の実施例を詳細に説明する。

【００４８】図１は、本発明の第１実施例の概略構成ブロック図を示す。撮像画像処理装置１０は、撮影レンズ及びズーム撮影用駆動制御機構を含む結像光学系１２、ＣＣＤイメージセンサのような撮像素子１４、撮像パラメータを計測及び制御する計測制御回路１６、映像信号処理回路１８、記憶装置２０、撮像動作の制御、撮像条件の制御、画像処理及び画像出力の制御信号を発生する制御信号発生回路２２、ＥＶＦ（電子ビュー・ファインダ）などのファインダを兼用する表示ディスプレイ２４、ペン型キー又は十字キーなどからなる指示選択装置２６、ストロボ発光装置２８、記録媒体３０、画像符号化回路３２、画像出力回路３４、被写体抽出回路３６、並びに、画像合成回路３８を具備する。

【００４９】撮像パラメータ計測制御回路１８は、撮影倍率を変更自在なズームレンズの倍率を検出する倍率検出回路、撮像素子１４の撮像面上の合焦状態を検出する合焦状態検出回路、撮像素子１４の電荷蓄積時間及び／又は結像光学系１２の絞りの開口径を制御する露光量制御回路、ストロボ発光制御回路、並びに、ガンマ特性、ニー特性及び色バランスなどの映像信号特性の制御信号を発生する制御信号発生回路を具備する。これらの一部は、ソフトウエアによって実現される。撮像パラメータは、撮影倍率、合焦度及び露光量のほかに、視線方向、ストロボ発光の有無、照明光の種類（例えば日光、蛍光灯、白熱灯及びストロボ光など）などを含む。視線方向は、映像信号処理回路１８に内蔵される視線検出装置（図示せず。）により検出される。

【００５０】映像信号処理回路１８は、ガンマ、ニー及びホワイトバランスなどの補正回路、オートフォーカス（ＡＦ）回路、自動露出制御（ＡＥ）回路、自動利得制御（ＡＧＣ）回路などを有する。

【００５１】指示選択装置２６はペン型キー及び／又は十字キーなどからなる。しかし、表示ディスプレイ２４

にタッチパネルが一体化されており、表示ディスプレイ２４の画面に操作用パネルが表示されるときには、その表示された操作用パネルは、指示選択装置２６の一形態となる。

【００５２】記録媒体３０は、例えば、磁気テープ、光ディスク又は光磁気ディスクなどのディスク媒体、フラッシュメモリ及びＩＣメモリなどの各種媒体からなる。本実施例では、記録媒体３０は、特別の媒体に限定されない。記録媒体３０は、撮像画像処理装置１０に着脱自在である。

【００５３】画像符号化回路３２は、画像データを、撮影条件などの付帯データと共に所定フォーマットで圧縮符号化する。

【００５４】図２を参照して、本実施例の特徴的な動作である被写体の抽出及び背景画像との合成過程を説明する。

【００５５】ユーザは、抽出すべき被写体を含む画像を撮影し（Ｓ１）、指示選択装置２６などを用いて被写体抽出回路３６により被写体の存在する領域画像を抽出する（Ｓ２，Ｓ３）。例えば、表示ディスプレイ２４に表示された入力画像の被写体の輪郭線上の数点を指示選択装置２６により指示して、被写体抽出の基準点を被写体抽出回路３６に設定する。被写体抽出回路３６は、隣り合う基準点間を結ぶようなエッジ追跡を所定の方法で実行して、一つの閉曲線としての被写体の輪郭線を得る。エッジデータは、入力画像に対して、周知の方法により、例えばＳＯＢＥＬ及びラプラシアンなどの空間微分フィルタリング処理により得ることができる。このようにして得られる閉曲線内部の領域の画像が、被写体画像として抽出される（Ｓ３）。被写体の輪郭に相当する閉曲線の抽出方法は、上述した方法に限定されない。

【００５６】抽出された被写体領域の画像データは、所定の圧縮方式（例えば、ウエーブレット変換及びＤＣＴ変換などを用いた圧縮符号化方式）により圧縮符号化され、また、撮影倍率及び露光条件（撮像素子の電荷蓄積時間及びストロボ発光の有無など）などの撮影条件とともに所定のフォーマットで記憶装置２０に格納される（Ｓ４）。

【００５７】次に、背景画像を撮影又は入力する（Ｓ５）。背景画像を表示しながら、先に抽出した被写体画像を記憶装置２０又は記録媒体３０から読み出す（Ｓ６）。背景画像と被写体画像との間の撮影条件の違いによる階調及び色調などの差異を抑制するように、被写体画像の階調及び色調を調整し（Ｓ７）、被写体の輪郭付近での背景画像との混合及び平滑化を行い、被写体画像を背景画像に上書きするように合成して、表示ディスプレイ２４の画面上に表示する（Ｓ８）。表示ディスプレイ２４の表示速度を上げるために、撮影条件に依存した補正処理は、合成画像の記録時に行なうようにしてもよい。

【００５８】図３は、表示ディスプレイ２４の表示画面例を示す。表示ディスプレイ２４上には、抽出処理の結果として得られた３つの被写体画像を表示する被写体画像表示領域４０ａ，４０ｂ，４０ｃ、合成画像表示領域４２、拡大表示を指示する拡大ボタン４４、縮小表示を指示する縮小ボタン４６、上下左右への移動を指示する移動キー４８、前処理への戻りを指示する戻りキー５０ａ、及び次の処理への以降を指示する送りキー５０ｂが表示される。

【００５９】ユーザの指示に従い、被写体画像の位置及びサイズを調整する（Ｓ９）。この時点では、被写体のサイズと位置を大まかに表わす補助枠５２が、合成画像上の被写体画像を囲むように表示される。選択された被写体画像（図３では、被写体画像表示領域４０ａに表示される画像）は、それと分かるように太枠などで強調表示される。このような表現方法は周知である。図４は、更に、同じ被写体画像を少し離して追加した合成例を示す。被写体画像が結果的に大きくなるので、被写体画像の位置とサイズを示す補助枠５２が、図３の場合よりも大きくなっている。

【００６０】ユーザは、拡大ボタン４４、縮小ボタン４６及び位置変更用の移動キー４８をタッチペン、マウス又は指により操作して、被写体画像のサイズ及び位置を変更できる。このようなボタン類を使ったグラフィカル・ユーザ・インターフェース自体は周知である。いうまでもないが、このような操作ボタン等を本体装置表面の所定位置に設定してもよい。戻りボタン５０ａにより前の処理段階に戻ることができ、送りボタン５０ｂにより次の処理段階に移行できる。

【００６１】抽出された被写体画像のサイズ及び位置の調整の結果、背景画像内の適切な配置及びサイズにあるとユーザが判断して、ユーザが、操作パネル上の合成記録ボタンを押すと、合成画像データ（勿論、補助枠５２を除く。）は、記憶装置２０又は記録媒体３０に圧縮符号化されて記録される（Ｓ１０）。この記録の際に、合成画像生成時に用いた撮影条件を付帯情報として符号化し、画像データ・ファイルのヘッダ部などに記録してもよい。付帯情報としては、撮影条件の他に、合成記録時の被写体部分の輪郭線上の各点の座標、その輪郭線に外接する矩形枠（例えば、図３の補助枠５２）の重心位置及び縦横サイズ、又は、その輪郭線に外接する楕円の重心位置、その主軸のサイズと方向及び楕円率などのパラメータを含めても良い。

【００６２】このような、被写体の形状、位置及びサイズに関する付帯情報は、合成画像とは別に、後の撮影で読み出して表示ディスプレイ２４に補助データとして画像に重ねて表示することもできる。このようにすることにより、同種の被写体について行う被写体の抽出から背景との合成までの一連の処理において、被写体抽出に要する手間を省くことができる。

【００６３】図５は、抽出被写体画像の輪郭線を先に背景画像に重畳表示し、被写体画像の位置及びサイズを調整してから、被写体画像を合成するようにした変更フローチャートを示す。Ｓ１１～Ｓ１５は、図２のＳ１～Ｓ５と同じである。抽出被写体画像の輪郭線を背景画像に重畳表示し（Ｓ１６）、被写体画像の位置及びサイズを調整する（Ｓ１７）。その後、抽出被写体画像データ及び付帯情報データを入力して、被写体画像を輪郭線の中に入るようにして背景画像に合成し（Ｓ１８）、撮影条件等に応じて被写体画像を補正し（Ｓ１９）、合成画像を記録媒体３０に記録する（Ｓ２０）。

【００６４】なお、背景画像と、抽出処理の行われる前の被写体画像中の背景とが殆ど同じである場合には、抽出されるべき画像領域は、背景部分をある程度含んでいても、撮影条件の違いなどの要因によって生じる変動分を除いては合成時に殆ど問題とならない。従って、このような場合には、上述したように矩形枠や楕円などで被写体を大まかに背景を含めて抽出して用いてもよいことはいうまでもない。

【００６５】従って、撮影時に被写体抽出処理により不要人物又は不要物体を除去して得られる画像、即ち、図６に示すように或る領域が欠落した画像を第１の画像とし、次に、背最画像を撮影すると、該当箇所の矩形枠５４内に相当する領域を自動抽出して、除去後の背景部分の画像領域を補填するように第１の画像を合成してもよい。図６の被写体画像４０ｃは、矩形枠５４内の画像を抽出して得られたものである。この場合も、表示手段に合成結果を表示し、ユーザの指示により、合成結果画像を符号化して所定の記録媒体に記録する。

【００６６】次に、本発明の第２実施例を説明する。第２実施例では、予め用意された画像（第１画像：動画又は静止画を問わない。）を本体の着脱自在な記録媒体または通信手段等を介して取り込み、現場で撮影した画像（第２画像：動画・静止画を問わない。）と合成し、その結果得られる合成画像を、本体の記録媒体または記憶装置に記録するか、又は、外部に出力する。図７は、その実施例の概略構成ブロック図を示す。図１と同じ構成要素には同じ符号を付してある。１４０は着脱自在な記録媒体、１４２は通信制御回路、１４４は、画像データ・フォーマット変換回路である。画像データフォーマット変換回路１４４は、通信制御回路１４２等を介して入力する種々のフォーマットの画像データを所定の内部形式に変換し、画像データを通信制御回路１４２を介して外部に出力する際には、内部形式から外部の所定の形式に変換する。

【００６７】本実施例では、第１画像が、切り出しが既に実行された被写体画像である場合、第１画像の入力後、前述した被写体抽出処理を行わずに、第１画像を第２画像（背景画像）と合成する。なお、第２画像に対して被写体抽出処理を行って、第１画像と合成してもよい。

【００６８】通信制御回路１４２を介して外部から入力する画像の形態及び画像の種類としては、例えば、ＴＶまたはビデオ画像、電話回線などを経由しての外部端末から送信されたファイル形式の文書画像及び写真画像等、並びに、他の画像入力機器（デジタルカメラ、スキャナ及びＦＡＸなど）からの無線又は有線で送信された画像データなど多様であり、本実施例は、いずれかに限定されるものではないが、データ形式は周知のものであるとする。同様に、記録媒体１４０に記録される画像データの種別も、そのフォーマットが周知のものであればよい。

【００６９】本実施例では、入力可能なデータ形式が予め定められ、ユーザはその中から選択する。具体的には、入力データ形式として符号化画像データを扱い、入力時にはその種別を判定（自動判定またはユーザによる手動判定）して、それがＤＰＣＭ等の符号化された映像信号か、或いは所定の符号化されたファイル形式かを識別する。映像信号としては、ＤＰＣＭ符号化またはＭＲ（モディファイド・リード）などのランレングス符号化された画像データ、ファイル形式としてＭＰＥＧ及びＱｕｉｃｋＴｉｍｅ（米国アップルコンピュータ社の商標）などの動画対応のもの、ＪＰＥＧ、ＴＩＦＦ、ＢＭＰ／ＤＩＢ、ＧＩＦ、ＰＩＣＴ及びＰＣＸなどのビットマップ形式、ＲＩＢなどのレンダリングアプリケーション用３次元シーン記述形式、ＰＣＬに代表されるプリンタのデータストリームと組み込みビットイメージ形式、その他ＰＰＴなどの描画データ形式、並びにＸＬＳなどのスプレッドシートイメージ形式が入力可能である。

【００７０】入力された画像データは復号化され、誤り訂正された後、必要に応じて、内部の画像処理に適合する一定の形式（ＴＩＦＦ、ＢＭＰ／ＤＩＢ又はＪＰＥＧなどのビットマップ形式が代表的である。）にフォーマットを変換される。

【００７１】第１画像が動画像であって、その中の１フレームから被写体を抽出して第２画像（背景画像）と合成する場合には、ユーザが選択した１フレームが静止画像のデータ形式に変換される。

【００７２】第１画像が既に被写体抽出された動画像であり、第２画像も動画形式の場合には、本体内部の画像処理手段の一部としてキー信号発生同路と合成回路を設けておき、第１画像内の被写体領域についてキー信号を発生して、被写体画像（前景画像）と背景画像を動画のままで合成しても良い。

【００７３】図８を参照して、図７に示す実施例の操作及び処理手順を説明する。先ず、ユーザは、第１画像の画像入力モードとして撮影入力、通信入力及び媒体入力の３種類の１つを選択し（Ｓ２１）、指定の画像入力モードで入力された画像を記憶装置２０に格納し（Ｓ２２）、表示ディスクプレイ２４に表示する（Ｓ２３）。

通信入力の場合には、通信形態またはソースを指定し、所定のプロトコル又は通信方法により画像データを一定時間または一定枚数入力し、記憶装置２０に記憶すると共に、表示ディスプレイ２４に表示する。媒体入力の場合には、記録媒体１４０の記録画像の一覧を表示し、そのなかから１又は複数の所望の画像を選択して記憶装置２０に読み込む。撮影入力の場合も、撮影した後の画像の表示・選択は同様である。

【００７４】ユーザは、ディスプレイ２４に表示される画像から適当な１枚の画像フレームまたは一連の動画像フレームを選択し（Ｓ２４）、第１画像として記憶装置２０に格納する（Ｓ２５）。

【００７５】ユーザは、第１画像に対して未だ被写体抽出処理がなされていない場合には、指示選択装置２６を使用して、第１画像から抽出すべき被写体画像を指定し、被写体抽出装置３６が、先の実施例と同様の処理により被写体画像を抽出する（Ｓ２６）。背景画像に対する被写体画像の位置及びサイズを調整する（Ｓ２７）。この時、背景画像に上書きして被写体画像を表示するか、或いは表示ディスプレイ２４への表示速度を下げないために被写体画像の輪郭線のみを背景画像に重ねて表示するかを指定する。そのための手段は、先に説明した実施例と同様で良い。

【００７６】被写体画像及び／又は背景画像にその撮影条件が付帯情報として付属している場合には、第１実施例と同様に、撮影条件の差異に基づいて一方の画像の階調及び色調等を他方の画像とほぼ合致するように変換して（Ｓ２８）、合成画像を生成し（Ｓ２９）、記録媒体１４０に記録する（Ｓ３０）。

【００７７】なお、撮影条件として照明光の種類及び露光条件が画像データに付属していない場合には、マニュアルで階調及び／又は色調を調整できるようにする（Ｓ３１～３３）。これは、撮影条件が画像データに付属していても、階調及び色調の自動補正に満足できない場合にも利用できる。具体的には、マニュアル調整モードに設定し（Ｓ３１）、図９に例示するように、表示パネルに明度変換用スライドバー（又はボタン）１５０、及び＊彩度変換用スライドバー（又はボタン）１５２を表示し、ユーザが何れかのスライドバー（又はボタン）１５０，１５２を操作すると、被写体画像部分の色調及びコントラスト（又は明度及び彩度）が調整される（Ｓ３２）。勿論、被写体の特定部分を指定してから、その色調などを調整することもできる。ユーザが合成結果を確認し、記録指示を入力すると（Ｓ３３）、合成画像が記録媒体１３０に記録される（Ｓ３０）。

【００７８】このようにして、撮影の現場で簡易な操作により自然な合成画像を生成し、記録することができる。

【００７９】上記各実施例で、被写体の抽出処理結果として得られる被写体輪郭線またはその輪郭線に略外接する矩形枠データを補助輪郭線データとして記憶装置２０又は記録媒体３０，１４０に記録しておいてもよい。図１０に示すように、表示パネルに補助輪郭表示ボタン１５４を設け、そのボタン１５４が押されると、制御信号発生回路２２が、その補助輪郭線データを記憶装置２０又は記録媒体３０，１４０から読み出し、表示ディスプレイ２４の画面上に補助輪郭線１５６として入力画像に重ねて表示させる。補助輪郭線１５６に囲まれる被写体像１５８は、被写体画像４０ｃと一致しなくても良い。

【００８０】設定された撮影条件（特に撮影倍率及び視線方向など）が変動すると、これに連動して、補助輪郭線１５６のサイズ位置及び形状が自動的に変更される。この場合、被写体に固有のサイズＡが予め付帯情報として与えられていれば、撮影倍率及び概略の被写体距離（合焦度などから推定する。）などの撮影条件によって決まる画面上でのサイズが計算され、そのサイズにあう大きさで補助輪郭線１５６が表示ディスプレイ２４に表示される。

【００８１】例えば、焦点距離をｆ、合焦レベルの最大値からのずれをｄｐ、被写体の標準サイズをＡ、結像光学系の第２主点位置から撮像素子面までの距離をｖとすると、画面上の被写体サイズＳは、下式で与えられる。即ち、

$$S = A(v-f)(1+(v-f)dp/f)/f \qquad (1)$$

但し、被写体距離の変動と合焦信号レベルの変動とが線形とする。従って、ｄｐを計測し、ｆをレンズ位置から求めれば、式（１）に基づき、補助データのサイズを倍率Ｓ／Ａに従って変更すればよい。

【００８２】また、ユーザは、必要に応じて指示選択手段２６を用いて補助データを適切な位置に設定し直し、またそのサイズなどを修正してもよい。

【００８３】上記実施例で使用した被写体抽出技術を説明する。一般的には、補助輪郭線（または補助輪郭線内部の領域データとしてのマスクデータ）を初期輪郭（又は初期領域）として入力画像上の適切な位置に設定表示し、それを初期データとして、以下の被写体切り出し処理を実行する。

【００８４】具体的には、動的輪郭をベースとする方法を使用する（Ｍ．Ｋａｓｓ，　Ａ．Ｗｉｔｋｉｎ，Ｄ．Ｔｅｒｚｏｐｏｕｌｏｓ，”Ｓｎａｋｅｓ：Ａｃｔｉｖｅ　Ｃｏｎｔｏｕｒ　Ｍｏｄｅｌｓ”，Ｉｎｔｅｒｎａｔｉｏｎａｌ　Ｊｏｕｒｎａｌ　ｏｆ　Ｃｏｍｐｕｔｅｒ　Ｖｉｓｉｏｎ，ｐｐ．３２１－３３１，１９８８）。動的輪郭法は、エッジ情報から物体の輪郭を抽出する方法であり、輪郭が滑らかであることと、エッジ上にあること等を拘束条件として表したエネルギー評価関数が最小となるように輪郭線モデルを変形することにより、初期輪郭線を物体上の輪郭に収束させるものであ

る。また、これを発展させた具体的な手法として、例えば、初期輪郭の近傍領域の画像と被写体部分の局所的な領域に関する画像の特徴量との差異に基づいて、動的輪郭の輪郭上の点に内向きまたは外向きの外力を作用させる手法が知られている（例えば、R. Ronfard, "Region-Based Strategies for Active Contour Models", International Journal of Computer Vision, pp. 229-251, 1994、及び、栄藤他「クラスタリングから得られる領域の記述に基づく動的な輪郭抽出」、電子情報通信学会論文誌D-II、vol. J75-D-II、pp. 1111-1119、1992など）。

【0085】画像切り出しの手法は特に限定されないが、上記の方法は、初期輪郭形状が被写体形状をよく近似する条件において自動的に切り出しが実行可能な方法であり、この点で好ましい。

【0086】切り出し対象の位置と大きさに関する大まかな指定（例えば、対象を囲む閉曲線又は矩形枠など）を行い、付帯データとして画像と共に予め記録しておいてもよい。撮影終了後、他の端末上で後処理により画像切り出し又は画像合成を行う。また、輪郭線内部の画像データをそのまま抽出し、背景画像と合成して記録してもよい。

【0087】図11は、本発明の第3実施例の概略構成ブロック図を示す。撮像画像処理装置210は、撮影レンズ及びズーム撮影用駆動制御機構を含む結像光学系212、CCDイメージセンサのような撮像素子214、撮像パラメータを計測及び制御する計測制御回路216、映像信号処理回路218、記憶装置220、撮像動作の制御、撮像条件の制御、画像処理及び画像出力の制御信号を発生する制御回路222、EVF（電子ビュー・ファインダ）などのファインダを兼用する表示ディスプレイ224、ペン型キー又は十字キーなどからなる指示選択装置226、ストロボ発光装置228、記録媒体230、画像符号化回路232、画像出力回路234、被写体抽出回路236、画像変換回路238、並びに撮影モード設定装置240を具備する。

【0088】図12に示すように、装置210を本体210aと画像処理部210bに分離し、画像処理部210bに被写体抽出回路236、画像変換回路238及び表示ディスプレイ224bを収容し、残りを本体210aに収容するようにしてもよい。

【0089】表示ディスプレイ224にタッチパネルが一体化されており、表示ディスプレイ224の画面に操作用パネルが表示されるときには、その表示された操作用パネルは、指示選択装置226の一形態となる。

【0090】映像信号処理回路218は、撮影倍率を変更自在なズームレンズの倍率を検出する倍率検出回路、撮像素子214の撮像面上の合焦状態を検出する合焦状態検出回路、撮像素子214の電荷蓄積時間及び／又は結像光学系212の絞りの開口径を制御する露光量制御回路、ストロボ発光制御回路、並びに、ガンマ特性、ニー特性及び色バランスなどの映像信号特性の制御信号を発生する制御信号発生回路を具備する。これらの一部は、ソフトウエアによって実現される。撮像パラメータは、撮影倍率、合焦度及び露光量のほかに、視線方向、ストロボ発光の有無、照明光の種類（例えば日光、蛍光灯、白熱灯及びストロボ光など）などを含む。視線方向は、撮像画像処理装置210に内蔵される視線検出装置（図示せず。）により検出される。

【0091】映像信号処理回路218は、ガンマ、ニー及びホワイトバランスなどの補正回路、オートフォーカス（AF）回路、自動露出制御（AE）回路、自動利得制御（AGC）回路などを有する。

【0092】記憶装置220は、フレームバッファ、ビデオRAM、変換撮影に用いるテンプレートデータ及び画像変換に用いる処理プログラムなどを格納するROM、並びにその他の一次記憶手段からなる。

【0093】記録媒体230は、例えば、磁気テープ、光ディスク又は光磁気ディスクなどのディスク媒体、フラッシュメモリ及びICメモリなどの各種媒体からなる。本実施例では、記録媒体230は、特別の媒体に限定されない。記録媒体230は、撮像画像処理装置210に着脱自在である。

【0094】画像符号化回路232は、画像データを、撮影条件などの付帯データと共に所定フォーマットで圧縮符号化する。

【0095】本実施例では、撮影時に自動的に撮影画像に所望の処理を施すことができる。これを、本明細書では、変換撮影モードと呼ぶ。変換撮影モードには、赤目補正モード、髭除去モード及びシミそばかすの除去／付加モードなどがある。ユーザは、被写体の画面中のサイズ及び位置などについて、自動検出モードとマニュアル設定モードの2モードから一つを選択可能であり、本実施例では、特にユーザからの指定がなければ、自動検出モードが設定されるものとする。

【0096】本実施例では、被写体カテゴリに属するモデル輪郭線又はその輪郭線に略外接する所定形状（矩形又は楕円等）の枠の輪郭線座標データを補助輪郭線データとして予め記憶装置220又は画像記録媒体230に記録して用意しておくものとする。また、モデル輪郭線としては、抽出対象のカテゴリを表わす形状の部分的輪郭線からなるもの、例えば、本出願と同じ出願人による特開平7-320086号公報に記載された局所特徴要素からなるモデルを用いてもよい。

【0097】自動検出モードでは、後述する方法により、倍率及び被写体距離などの撮影条件に基づき設定されるサイズを有する補助輪郭線（上述のモデル輪郭線）データを画面上の端から順に走査し、各場所で入力画像

のエッジ強度分布との一致度（例えば、相関値）を評価し、その一致度の極大位置を最適位置として求める。このようにして、抽出対象領域が複数含まれているような場合であっても、複数の被写体領域の位置の検出及び領域抽出を自動実行することができる。

【００９８】各変換モードの内容を簡単に説明する。髭除去（付加）モード及びシミそばかす除去モード等では、入力画像から先ず人物の頭部又は顔を検出する。

【００９９】顔又は目の検出処理としては、他に標準テンプレート画像（濃淡画像又はカラー画像）を用い、撮影条件に基づきそれを適切なサイズに変更して画像中の各位置で相関値を求め、相関が最大又は極大となる位置を検出する方法でよい。

【０１００】マニュアル設定モードでは、制御回路２２２は、以下に示すように補助輪郭線（閉曲線等で表示される顔の輪郭線など）をディスプレイ２２４の画面上に表示し、その補助輪郭線内に概略収まるように、ユーザが倍率及び視野方向などの撮像条件を調節し、又は、補助輪郭線の位置及びサイズを変更する。

【０１０１】自動検出モードにおける赤目補正では、入力画像中の目を検出し、赤目に相当する画素を選択的に黒色などに変換する。この処理の詳細は後述する。マニュアル設定モードでは、目のモデル輪郭線（両眼又は片眼）を補助輪郭線としてディスプレイ２２４の画面上に表示し、撮像条件をユーザに設定してもらう。

【０１０２】髭除去モードでは、顔領域の検出後、顔の肌色成分を抽出し、顔の中の頭髪を除き、髭の存在しうる領域において黒色又は灰白色の領域画素を肌色に変換する。

【０１０３】シミそばかす除去モードでは、顔領域の検出後、顔の肌色成分の代表色成分値を抽出し、顔の中の特に頬、顎及び額の各領域において肌色代表色成分値と異なる色成分を有する領域の画素値を代表色の色成分値に変換する。

【０１０４】以上の各モードは、被写体の特定部分を変換するものであり、その変換対象範囲を高い精度で特定することが必要となる。図１３を参照して、被写体領域の抽出過程及び被写体部分の画像変換過程の詳細を説明する。

＊

$$S=A(v-f)\{1+(v-f)dp/f\}/f \qquad (2)$$

但し、被写体距離の変動と合焦信号レベルの変動が線形であるとする。

【０１０９】従って、ｄｐを計測し、ｆをレンズ位置計測等により求めることにより、式（２）に基づいて補助データのサイズを倍率Ｓ／Ａに従って変更すればよい。被写体距離は、他の手段（例えばレーザ光等を用いた測距手段）により推定してもよいことは言うまでもない。

【０１１０】被写体抽出装置２３６は、補助輪郭線（又は補助輪郭線内部の領域データとしてのマスクデータ）を初期輪郭（初期領域）として入力画像上の適切な位置

＊【０１０５】ユーザは先ず、撮影モード設定装置２４０により変換撮影モードを設定する（Ｓ４１）。変換撮影モード設定後、変換の対象となる被写体を含む画像を撮影し（Ｓ４２）、自動検出モードかマニュアル設定モードかを判別する（Ｓ４３）。

【０１０６】マニュアル設定モードの場合（Ｓ４３）、指示選択装置２２６などを用いて被写体抽出装置２３６により被写体の存在する位置を指定する（Ｓ４４）。例えば、指示選択装置２２６９としてペンタイプのものを用いる場合には、表示ディスプレイ２２４に表示された入力画像の被写体の基準点（顔の中心など）に相当する点をそのペンで指示する。視線検出手段により検出して得られる視線方向の位置を基準点としてもよい。

【０１０７】自動検出モードの場合（Ｓ４３）、（図１４に示すように）、制御回路２２２は、補助輪郭線データを記憶装置２２０又は記録媒体２３０から読み出す（Ｓ４５）。更に、表示ディスプレイ２２４の画面上に、基準点位置を中心に入力画像に重ねて補助輪郭線２５０（図１４）を表示してもよい。補助輪郭表示用のボタン２４８（図１４）を押すことにより、この表示動作が起動されるようにしてもよい。この補助輪郭線は、前述したように、閉曲線等で表される顔の輪郭線などであり、変換されるべき領域の概略形状等を示すものである。即ち、単に対象の位置を示すだけのマーカとは異なる。

【０１０８】制御回路２２２は、設定された撮影条件（特に倍率及び視線方向など）に応じて、又はその変動に応じて、補助輪郭線データのサイズ、位置又は形状を自動的に設定し変更する（Ｓ４６）。この場合、被写体に固有のサイズＡが予め付帯情報として与えられているものとし、制御回路２２２は、倍率及び概略の被写体距離（合焦度などから推定）などの撮影条件から画面上での補助データサイズを計算し、適切なサイズに変換して閉輪郭線として表示ディスプレイ２２４に表示させる。例えば、焦点距離をｆ、合焦レベルの最大値からのずれをｄｐ、被写体の標準サイズをＡ、結像光学系の第二主点位置から撮像素子２１４の撮像面までの距離をｖとすると、画面上の被写体サイズＳは、下記式で与えられる。即ち、

に設定し、それを初期データとして被写体領域の抽出処理を実行する（Ｓ４７）。但し、マニュアル設定モードが選択されている場合には、設定された補助輪郭線内部を被写体領域として抽出する。撮影モードとして例えば赤目補正モードを設定した場合、補助輪郭線として、両眼の形状輪郭線モデル又は標準撮影距離に対応する人物画像の両眼を包含し両眼の間隔と同程度のサイズを有する矩形などが用いられる。

【０１１１】本実施例では、本出願と同じ出願人による特開平９－１８５７１９号公報に記載される動的輪郭法

をベースとした方式を用いる。動的輪郭法とは、輪郭線モデル（初期輪郭：本実施例では、補助輪郭線に相当する。）が与えられ、輪郭形状が滑らかであることとエッジ上にあること等を拘束条件として表したエネルギー評価関数が最小となるように、輪郭線モデルを変形することにより物体上の輪郭に収束させる方法である。

【０１１２】撮像条件に基づき補助輪郭線に関するサイズ等を変換することにより、補助輪郭線と抽出されるべき被写体の輪郭線とを、自動的に概略一致させることができるので、背景部分の画像パターンの複雑さ及び被写体形状の複雑さによらずに、変換されるべき被写体領域を高速かつ安定に抽出できる。

【０１１３】このようにして自動的に得られる輪郭線（閉曲線）内部の領域を被写体領域として抽出した後、被写体領域内では’１’、それ以外で’０’となるような２値のマスクデータが生成される。マスク領域（例えば、マスク値が’１’の領域）に属する画像に対して、画像変換装置２３８は、変換撮影モードに応じた変換処理を実行する（Ｓ４８）。

【０１１４】例えば、撮影モードとして赤目補正モードが設定されている場合、抽出された領域の赤色成分の画素に赤目補正処理が行われる。具体的には、図１５に示すように、マスク領域において特定色である赤色成分を多く含む画素を探索し（Ｓ６１）、その連結領域を抽出する（Ｓ６２）。そして、その連結領域に隣接する領域であって、黒又は茶など予定された色成分の範囲内にある画素の集合から代表色成分を抽出し（Ｓ６３）、該当する画素の色成分値を代表色（黒色など）に変換する（Ｓ６４）。代表色としては許容する色成分値を予め定めるのではなく、該当する画素の近傍にある画素であって非赤色かつ非白色の色成分値を有するものの色成分値（例えば、茶色、青色又は金色成分など）を用いてもよい。連結領域を抽出せずに、マスク領域内の赤色成分画素を予め設定された色成分値を有するように一律に変換してもよい。

【０１１５】赤目補正モード、シミそばかす除去モード及び髭除去モードなどに共通して用いられる変換部分の領域の特定が可能な自動処理（図１３のＳ４７で特定されるべき領域の抽出処理に該当する。）の一例を、図１６を参照して説明する。ここでは、補助輪郭線は、変換すべき対象の輪郭線モデルとして与えられ、上述したように、倍率及び被写体距離などの撮像条件に基づき予めスケーリングがなされるものとする。

【０１１６】先ず、輪郭線モデルの特徴点としてその変曲点、コーナー及び曲率極大点などの種別のうちの一つに該当する点を抽出し（Ｓ７１）、それぞれの種別と位置を記録しておく。このデータは、輪郭線モデルの付帯データとして予め与えておいてもよい。

【０１１７】入力画像のエッジ強度分布をＳｏｂｅｌ、Ｐｒｅｗｉｔｔ又はＣａｎｎｙなどの空間微分演算を伴うフィルタリングにより求める（Ｓ７２）。得られたエッジ強度分布を所定の閾値により２値化し、必要に応じて細線化又はエッジ強度分布の最大位置追跡などの処理を加えて輪郭線データを抽出する（Ｓ７３）。

【０１１８】抽出された輪郭線からモデルデータと同様に特徴点（及びその種別）を検出し（Ｓ７４）、両輪郭線データ間の特徴点間を対応付けし（Ｓ７５）、対応点間の位置ずれベクトルを抽出する（Ｓ７６）。この位置ずれベクトルは、重心を中心とした相対変位を与えるので、そのオフセット量がゼロとなるようにするなどして、正規化される（Ｓ７６）。

【０１１９】位置ずれベクトル量に対応する変位を各特徴点に与え（Ｓ７７）、移動後の隣接する特徴点間を結ぶ曲線をスプライン補間などにより生成して、輪郭線モデルを変形する（Ｓ７８）。

【０１２０】曲線間の対応付けは、上述した方法に限定されるものではなく、他の方式を用いてもよいことは言うまでもない。

【０１２１】このようにして得られる、変形された輪郭線モデルの輪郭線（閉曲線）内部の領域が、画像変換の対象となる特定された領域である。更に、必要に応じて、動的輪郭法など他の手法を用いて補正してもよい。上述のマッチング処理と変形領域の特定により、変換が必要な部分の形状の複雑さなどによらずに、撮影画像（撮像素子２１４の出力画像）に所望の画像変換が自動的に施される。

【０１２２】以上のような被写体領域抽出及び画像変換処理の後、符号化回路２３２が、変換後の画像を圧縮符号化し（Ｓ５０）、記録媒体２３０に記録する（Ｓ５１）。これと同時に、又は、画像出力信号発生回路２３４が、変換後の画像から映像信号（ＮＴＳＣ方式又はＰＡＬ方式など）を生成し、出力する（Ｓ５２）。

【０１２３】符号化回路２３２から出力される画像フォーマットでは、例えば、ヘッダ又は別途作成される付帯情報データファイルに画像変換の実行の有無、変換撮影モード、変換位置、補助輪郭線データ、並びに、必要に応じて、撮像条件、撮影日時、圧縮率及び圧縮方式などの付帯情報が記録される。これらの項目の記録フォーマットに関する表現方法の一例を図１７に示す。

【０１２４】付帯情報は、画像上に視覚的には知覚できないように電子的透かしデータ（Ｐｒｏｃ ｏｆ ｔｈｅ ＩＥＥＥ、ｖｏｌ．８３、ｐｐ．９４４－９５７．１９９５）として記録しても良い。例えば、画像データを表す最下位ビットをこれらデータの書き込みビットとして割り当て、画像中のエッジ部分に埋め込むなどの方法がある。この場合、特に変換部分の輪郭線を画像データに重畳して記録することができる。

【０１２５】本実施例では、図１４の被写体２５２と抽出用モデルとなる被写体画像２４２ｃとは必ずしも一致しなくてよい。動的輪郭法等により正しい被写体の輪郭

線を求めることができるからである。

【０１２６】本実施例では、抽出された対象領域に画像変換を施したが、逆に、その背景部分に画像変換を行ってもよいことはいうまでもない。これは、以下の実施例についても同様である。

【０１２７】図１２に示す構成では、撮影後、撮像条件、画像データ及びモデル輪郭線などを被写体抽出回路２３６に供給し、撮像条件を活用して変換領域を求め、上述したような画像変換を行なってもよい。この場合、本体２１０ａから分離した画像処理部２１０ｂは、例えば、コンピュータにより実現できる。被写体抽出回路２３６及び画像変換回路２３８の機能は、図１３及び図１５等に示す手順のプログラムにより実現される。

【０１２８】次に、入力画像に対し上述の実施例で示した方法で設定又は抽出された所定の画像部分に対して、幾何学的変換処理又は置換処理等を行なう実施例を説明する。全体的な手順のフローチャートを図１８に示す。図１８は、変換撮影モードの設定を除いて、基本的に図図１３に示す処理フローと同じである。

【０１２９】対象となる変換処理（図１８のＳ８９）は、例えば、髪型変換、髭付加変換、顔型変換、似顔絵化、顔又は身体のパーツ（腕及び足など）又は身体全部について画像領域を太らせ又は細らせる処理、顔の構成要素である目、鼻及び口など各部の変形又は各部間の幾何学的配置の変更、並びに、各部の予め用意されたパーツ画像データへの置換処理などである。

【０１３０】この実施例では、変換撮影モードを設定し（Ｓ８１）、その後、上述したような変換の種別とともにその程度を設定し、又は同一変換カテゴリのうちの更に細分化したタイプ等を選択する（Ｓ８２）。

【０１３１】変換対象となる被写体領域を抽出し（Ｓ８８）、その後、撮像条件又は抽出領域のサイズ等を用いて、変換対象の形状によく適合するような変換処理を実行する（Ｓ８９）。

【０１３２】髭付加変換モードは、予め選択された髭の画像データを画像中の顔の所定位置にいわゆるテクスチャマッピング（竹村伸一著「レイトレーシング」オーム社刊を参照）する処理である。図１９に、髭付加の変換撮影モードが設定された場合の髭タイプの選択画面の一例を示す。髭のタイプ別画像の一覧が表示され、ユーザは、その中の一つを指示選択装置２４０を用いて選択する。例えば、十字キーを用いて画像を囲む枠を移動し、不図示の確認ボタンを押して選択する。画面右下のサブウインドウに入力画像が表示されている。髭のタイプを選択した後、画面に表示される‘次へ’のボタンを押すと、図２０に示すように、処理結果がディスプレイに表示される。ユーザが確認ボタン等を押すことにより、変換撮影（変換画像を符号化して記録媒体に記録すること、又は変換画像の映像信号を外部へ出力することなど）が最終的に完了する。髭のテクスチャマッピングは、髭画像のテクスチャーデータを式（２）及び抽出領域の形状を用いて適切なサイズと位置にマッピングされるようにして行なわれる。

【０１３３】顔型変換モードでは、入力画像中の顔画像とターゲットとなるべき顔画像データとの間のいわゆるモーフィング又は置換などが行なわれる。本出願と同じ出願人による特開平７－３２００８６号公報に記載された局所特徴要素からなるモデルを用いて、入力画像とターゲット画像の顔の各部品（目、鼻及び口など）間の対応をとることにより、自動的に顔型変換が実行される。この場合、上述の実施例で説明したのと同様に、ターゲットの顔画像が撮像条件に基づく自動スケーリングにより適切なサイズに変換された後、モーフィングや置換などの処理が実行される。

【０１３４】似顔絵化モードでは、顔領域を検出した後、予め用意してある顔のスケッチモデルデータ（いわゆる、テンプレートモデル）を先に説明したように自動スケーリングし、入力画像の顔領域のエッジ強度分布とスケッチモデルの顔の部品との間で対応をとり、更に部品間配置（各重心位置など）のモデルデータからの移動量及び各部品の変形量を線形又は非線形に増幅して顔の造作を誇張する。これにより、似顔絵化した顔の線画像が生成される。

【０１３５】以上の変換処理において、変換対象領域（顔領域など）の位置を検出するには、図１３以降を参照して説明したのと同様に、変換対象（顔など）のモデル輪郭線データを記憶装置から入力し、これを式（２）などにより撮像条件を用いて適切なサイズに変換したものを画像中で走査し、入力画像のエッジ強度分布から求めた輪郭線との相関値が最大（又は極大）となる位置を求めればよい。

【０１３６】これらの変換処理の前処理を一般化した処理フローの一例を図２１に示す。テンプレートモデルは、撮像条件（倍率、被写体距離及び視線方向など）に基づき適切なサイズに変換され（Ｓ１０１）、テンプレートモデルの特徴点としてその輪郭線データ上の変曲点、コーナー及び曲率極大点などが抽出され、又は、特徴点データが記憶装置からテンプレートモデルデータの付帯情報として読み込まれる（Ｓ１０２）。入力画像のエッジ強度分布を抽出し（Ｓ１０３）、２値化及び輪郭線抽出等を行い（Ｓ１０４）、テンプレートモデルで抽出された特徴点と同様の特徴点を探索及び抽出する（Ｓ１０５）。

【０１３７】特徴点間を対応付けする（Ｓ１０６）。これにより、目、鼻及び口などの顔を構成する部品間を対応付けることができる。即ち、テンプレートモデルの画像上での重心位置及びサイズが、撮像条件等に基づき予め適切に設定されているので、テンプレートモデルでの各部品（目、鼻及び口など）上の特徴点ごとに入力画像において各特徴点ごとの近傍範囲で対応する特徴点を探

索し、検出することができる。

【０１３８】対応点間の位置ずれベクトルを抽出し、重心位置を基準として正規化する（Ｓ１０７）。この結果に基づき、各種画像変換を実行する（Ｓ１０８）。

【０１３９】顔領域の細らせ（太らせ）処理を例に、変換対象領域（顔画像領域など）の変形処理を説明する。顔の細らせ処理は、輪郭線内部の領域について縦倍率が１に対して横倍率をａ（ここに、０＜ａ＜１）とする変倍変換（アフィン変換）である。太らせ処理では、ａ＞１となる。

【０１４０】顔領域の位置（重心などの基準点位置）が検出された後、その輪郭線を図１６に示す方法で求める。図２２は、顔の細らせ処理の変換前後の一例を示す。細らせ変換撮影では、細くした顔と背景部分との間に隙間が発生する。この間隙部分の画像データは、以下のようにして生成される。即ち、元の画像中の顔領域の各輪郭線に隣接する背景部分の画像データの色成分値又はテクスチャパターンを抽出し、該当部分の画素にその隣接する部分の色成分値を与えるか、又は隣接領域のテクスチャパターンをマッピングする。予め背景全体の画像を撮影しておき、間隙部分を、該当する背景画像で置換してもよい。

【０１４１】太らせ処理では逆に元の画像データの背景領域に変換対象領域がはみだすことになるが、変換後の領域の輪郭線内部の画像データを元の変換対象部分のアフィン変換画像データで補間すればよい。

【０１４２】その他の変換処理として他の顔画像に置換する場合は、変換対象の画像領域を上述したように設定されたテンプレートサイズに変換された他のターゲット画像で置換するとともに、形状が一致しないことにより生ずる間隙部分（図２２（２）参照）などの領域に、顔の細らせ処理の場合と同様に背景画像データをテクスチャマッピング又は色成分の外挿などにより挿入する。

【０１４３】似顔絵化を行う場合には、抽出された各部品間の位置ずれベクトルを誇張の程度を表す誇張率を与えて所定最増幅することのできる中割り（ｉｎ－ｂｅｔｗｅｅｎ）法などの線形外挿法により、元のテンプレートモデルの輪郭線データを変形する。例えば、本出願と同じ出願人による特開平７－３２００８６号公報に記載された局所特徴要素からなるテンプレートモデルに基づき、各局所特徴要素の各特徴点の新たな位置を線形外挿法により求め、その結果得られる新たな局所特徴要素を滑らかに結ぶ曲線を生成する。これにより、似顔絵化した顔画像が求められる。

【０１４４】変換後の画像の符号化及び記録に際しては、変換対象となった領域の元の画像データも変換後の対象領域の輪郭線データとともに保存しておくことができる。これにより、後で必要な時にコンピュータなどの処理装置を用いて元の画像データを容易に復元することができる。その記録形態としては、変換後の画像データファイルとは別個のファイルに変換前の対象領域の部分画像を記録したり、或いは変換後の画像データファイルのヘッダ部分に記録してもよい。変換前の部分画像データファイルを生成する場合には、そのヘッダ部に変換後の画像データファイル名などを記録する。

【０１４５】背景画像を予め撮影しておき、その背景画像と変換対象を含む入力画像との差分に基づき対象の領域を抽出し、その領域にユーザの指定する画像変換を施すようにしてもよい。ここでは、撮像装置は三脚などに固定されない手持ち撮影で使用されるものとし、背景画像撮影時と被写体を含む入力画像撮影時とでピントや露光条件等が異なることを前提条件とする。ピンと及び／又は露光条件が一致する場合には、処理はより容易になる。

【０１４６】撮影動作並びに対象領域の抽出及び変換処理過程のフローチャートを図２３に示す。

【０１４７】背景画像を撮影し（Ｓ１１１）、このときの撮像条件を抽出し（Ｓ１２５）、記憶装置２２０などに記憶しておく。変換撮影モードを設定し（Ｓ１１２）、必要に応じて変換ターゲット（髪型、髭型及び顔型など）及び変換の程度を指定する（Ｓ１１３）。被写体画像（先の実施例での入力画像）を撮影し（Ｓ１１４）、このときの撮像条件も抽出し（Ｓ１２６）、記憶装置２２０に記憶する。

【０１４８】その後、背景画像と入力画像間の対応点を抽出し（Ｓ１１５）、手持ち撮影ゆえに生じる回転、平行移動及び倍率変動などの影響を除去するために、対応点抽出データ及び画像間の撮像条件の違いを考慮した背景画像の幾何学的変換パラメータ（アフィン変換又は透視変換パラメータ）を推定し、抽出する（Ｓ１１６）。撮像条件の違いを考慮することにより、対応点抽出処理における誤対応を除去し、高い精度での幾何学的変換を可能にする（Ｓ１１７）。

【０１４９】対応点間の画素値及び露光条件などの撮像条件の相違を考慮して階調変換パラメータを求めて、背景画像の階調を変換する（Ｓ１１８）。具体的には、対応点間の画素値（ＲＧＢ各色成分値など）を参照して、０から２５５レベルでの各階調に対する背景画像から入力画像の対応点への画素値変換テーブルを推定する。その際、撮影条件（露光条件など）を考慮して、明らかに撮像条件の変動量に不適合な対応点どうしの画素値データを排除することにより、一層の高精度化を達成できる。

【０１５０】このようにして変換された背景画像と入力画像との差分をとり、所定の閾値で２値化するなどの処理により、被写体領域が抽出される（Ｓ１１９）。以後の処理は、図１８の場合と同じであるので、詳細な説明を省略する。

【０１５１】

【発明の効果】以上説明したように、本発明によれば、

集合写真、記念写真又はカタログ写真において、その場に存在しない人物又は物体を入れた自然な合成画像を、現場の構図及び撮影条件に合わせて簡易な操作により生成し、また撮影現場で記録できる。

【０１５２】予め記録された被写体の形状及びサイズなどに関する補助輪郭線を用いることにより、同じ背景であれば補助輪郭線内の画像を用いるだけで自動的に被写体抽出と合成画像生成を行うことができる。

【０１５３】不要な人物または物体の除去も、その形状の複雑さによらず、背景のみの画像の撮影を行うことにより、簡単に除去して、除去後の部分に相当する背景部分のはめ込みを簡易な操作で行うことができる。

【０１５４】また、本発明によれば、撮像条件を用いることにより、撮像時（画像入力時）に画像入力手段において任意の形状を有する主被写体画像部分又は主被写体を除いた背景画像部分を、背景の画像パターン及び照明条件などに影響されずに精度よく特定し、該当部分に任意の変換又は加工処理を施す自動（半自動）変換撮影が可能になり、そのような変換を施した画像を記録又は伝送できる。

【０１５５】また、撮影条件を参照して、モデル輪郭線を画像中の適切な位置に設定できるので、高速かつ自動で、変換対象となる部分の領域を画像から抽出でき、所望の変換撮影を行うことができるようになる。

【図面の簡単な説明】

【図１】　本発明の第１実施例の概略構成ブロック図を示す。

【図２】　被写体の抽出及び背景画像との合成過程のフローチャートである。

【図３】　表示ディスプレイ２４の表示画面例を示す。

【図４】　同じ被写体画像を少し離して追加した合成例である。

【図５】　本実施例の合成処理の別のフローチャートである。

【図６】　本実施例の別の画面例である。

【図７】　本発明の第２実施例の概略構成ブロック図である。

【図８】　図７に示す実施例の動作フローチャートである。

【図９】　マニュアルで階調及び／又は色調を調整できるようにした画面例である。

【図１０】　補助輪郭表示ボタン１５４を具備する画面例である。

【図１１】　本発明の第３実施例の概略構成ブロック図である。

【図１２】　第３実施例の変更例の概略構成ブロック図である。

【図１３】　第３実施例における変換撮影処理の手順を示すフローチャートである。

【図１４】　第３実施例における表示画面例である。

【図１５】　第３実施例における画像変換処理のフローチャートである。

【図１６】　第３実施例における被写体領域自動抽出処理のフローチャートである。

【図１７】　第３実施例における画像記録フォーマットの表現例である。

【図１８】　画像変換処理の別のフローチャートである。

【図１９】　髭付加変換撮影時の選択メニュー表示画面

【図２０】　髭付加変換後の画像例である。

【図２１】　図１８に示す画像変換の前処理のフローチャートである。

【図２２】　細らせ変換撮影の変換前後の被写体画像の一例である。

【図２３】　画像変換処理の更に別のフローチャートである。

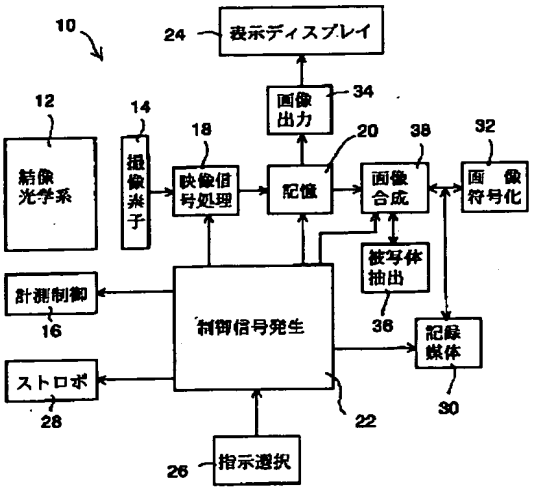
【符号の説明】

１０：撮像画像処理装置
１２：結像光学系
１４：撮像素子
１６：計測制御回路
１８：映像信号処理回路
２０：記憶装置
２２：制御信号発生回路
２４：表示ディスプレイ
２６：指示選択装置
２８：ストロボ発光装置
３０：記録媒体
３２：画像符号化回路
３４：画像出力回路
３６：被写体抽出回路
３８：画像合成回路
４０ａ，４０ｂ，４０ｃ：被写体画像表示領域
４２：合成画像表示領域
４４：拡大ボタン
４６：縮小ボタン
４８：移動キー
５０ａ：戻りキー
５０ｂ：送りキー
５２：補助枠
５４：矩形枠
１４０：記録媒体
１４２：通信制御回路
１４４：画像データ・フォーマット変換回路
１５０：明度変換用スライドバー（又はボタン）
１５２：彩度変換用スライドバー（又はボタン）
１５４：補助輪郭表示ボタン
１５６：補助輪郭線
１５８：補助輪郭線１５６に囲まれる被写体像
２１０：撮像画像処理装置

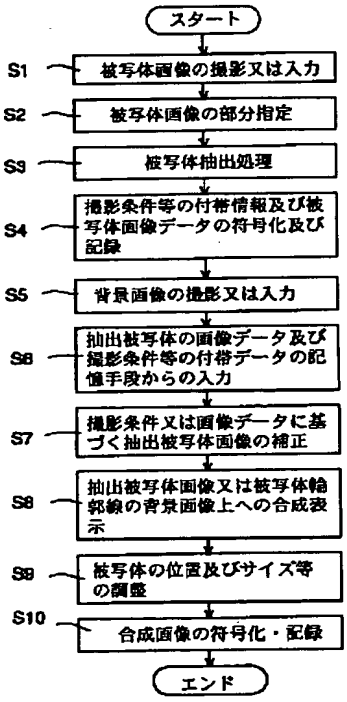
２１０ａ：本体
２１０ｂ：画像処理部
２１２：結像光学系
２１４：撮像素子
２１６：計測制御回路
２１８：映像信号処理回路
２２０：記憶装置
２２２：制御回路
２２４，２２４ｂ：表示ディスプレイ
２２６：指示選択装置
２２８：ストロボ発光装置
２３０：記録媒体

２３２：画像符号化回路
２３４：画像出力回路
２３６：被写体抽出回路
２３８：画像変換回路
２４０：撮影モード設定装置
２４２ａ，２４２ｂ，２４２ｃ：抽出用モデル
２４４：方向キー
２４６：送り／戻りキー
２４８：補助輪郭表示用のボタン
２５０：補助輪郭線
２５２：被写体

【図１】



【図２】



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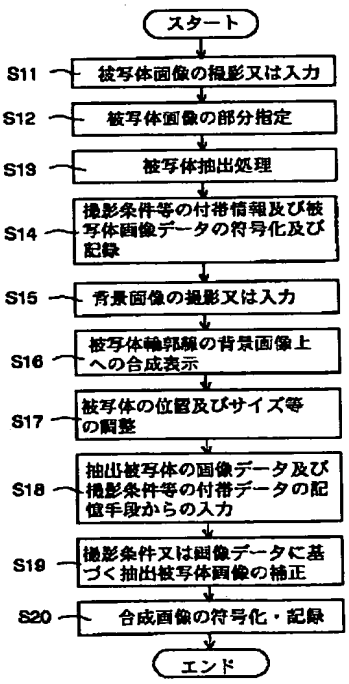
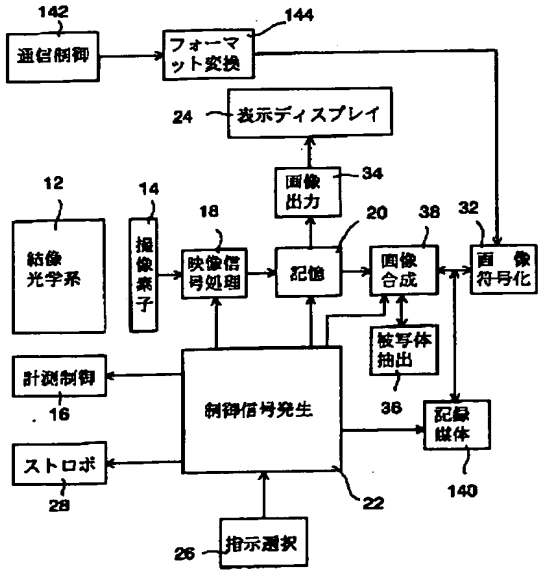
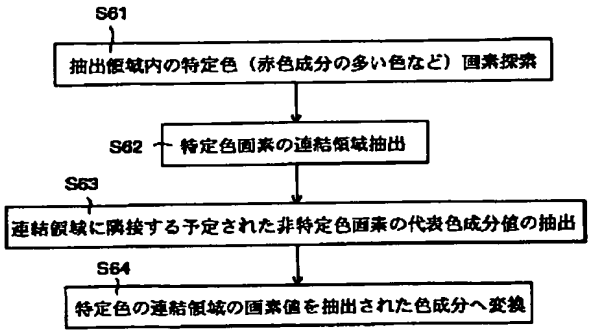


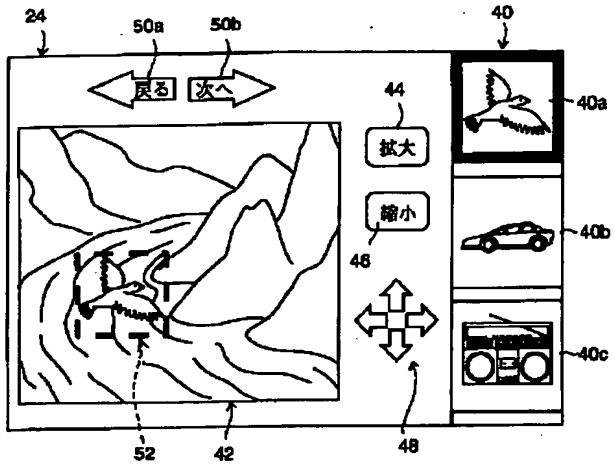
【図７】



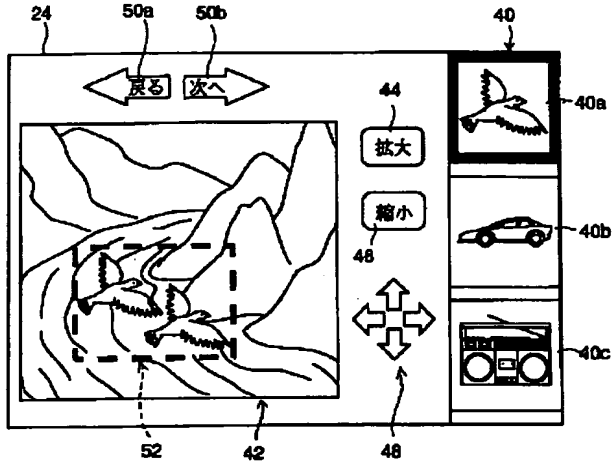
【図１５】



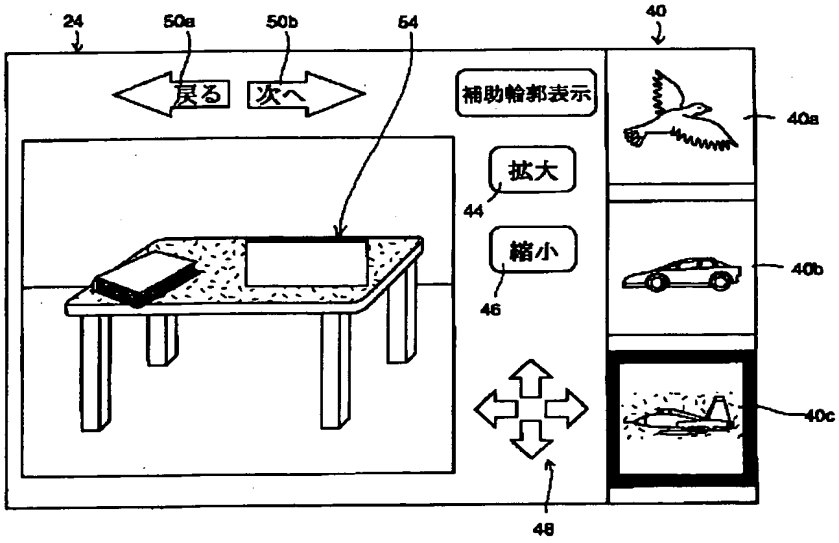
【図３】



【図４】



【図６】

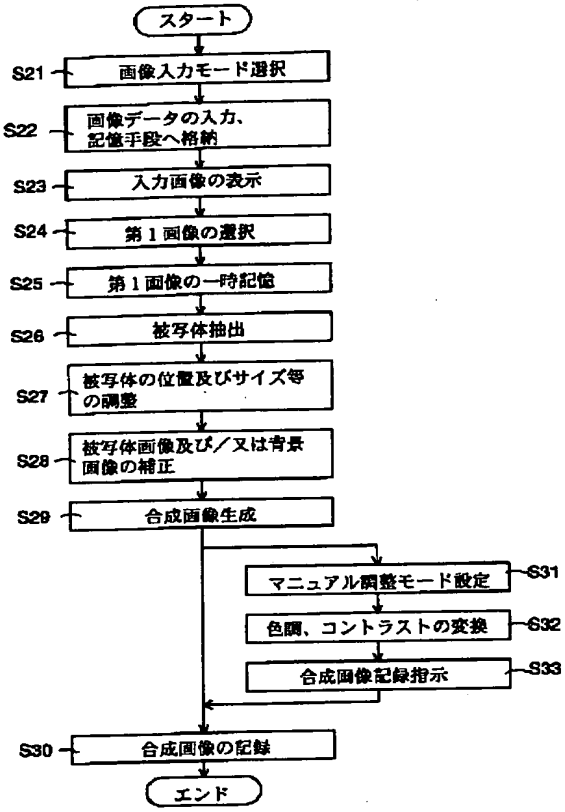


【図１７】

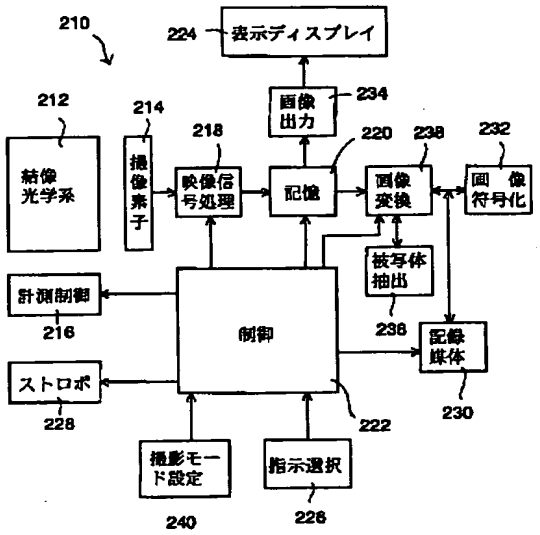
項目	データ形式
画像データファイル名	16ビットキャラクタ
変換撮影の有無	整数　0又は1
変換撮影モード	整数 1:赤目補正、2:髪型変換、3:髭除去、4:髭付加、 5:顔型変換、6:似顔絵化、7:シミそばかす除去、
変換部分の輪郭線形状	整数　x1, y1, x2, y2,.....
変換モデル画像データ (髪、髭、顔タイプ等)	24ビットカラー、ビットマップ形式

【図２０】

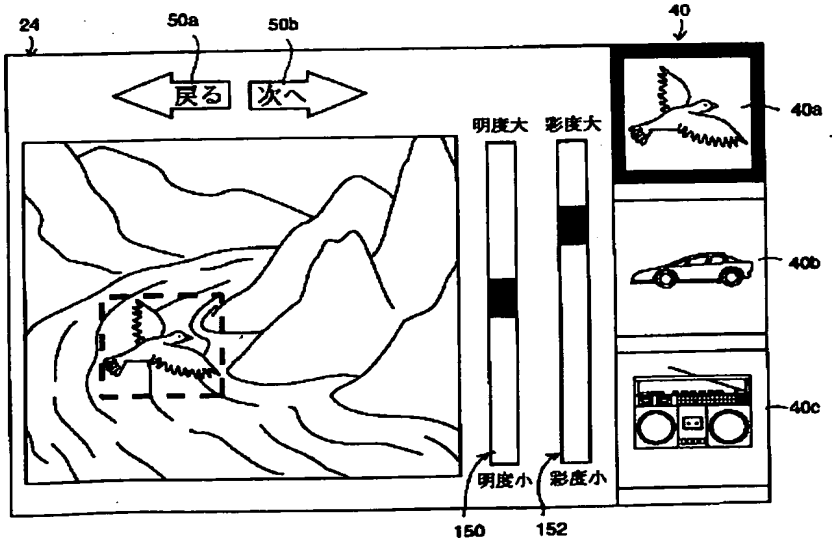
【図８】


スタート
S21
画像入力モード選択
S22
画像データの入力、記憶手段へ格納
S23
入力画像の表示
S24
第１画像の選択
S25
第１画像の一時記憶
S26
被写体抽出
S27
被写体の位置及びサイズ毎の調整
S28
被写体画像及び／又は背景画像の補正
S29
合成画像生成
マニュアル調整モード設定
S31
色調、コントラストの変換
S32
合成画像記録指示
S33
S30
合成画像の記録
エンド

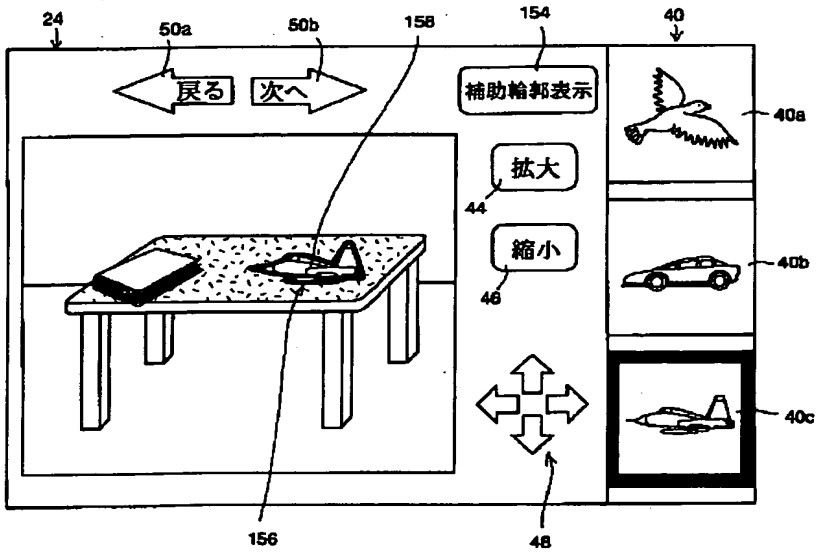
【図１１】


210
224
表示ディスプレイ
212
結像光学系
214
撮像素子
218
映像信号処理
画像出力
234
220
記憶
238
画像変換
232
画像符号化
被写体抽出
236
計測制御
216
制御
記録媒体
230
ストロボ
228
222
撮影モード設定
240
指示選択
226

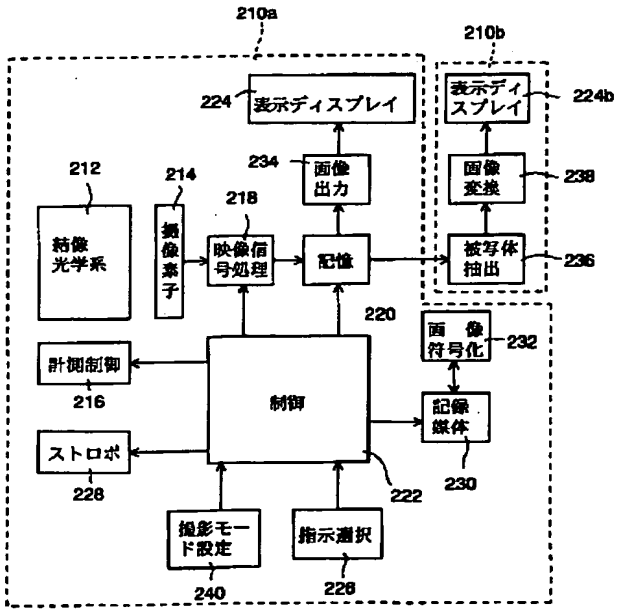
【図９】


24
50a
50b
40
戻る
次へ
明度大
彩度大
40a
40b
40c
明度小
彩度小
150
152

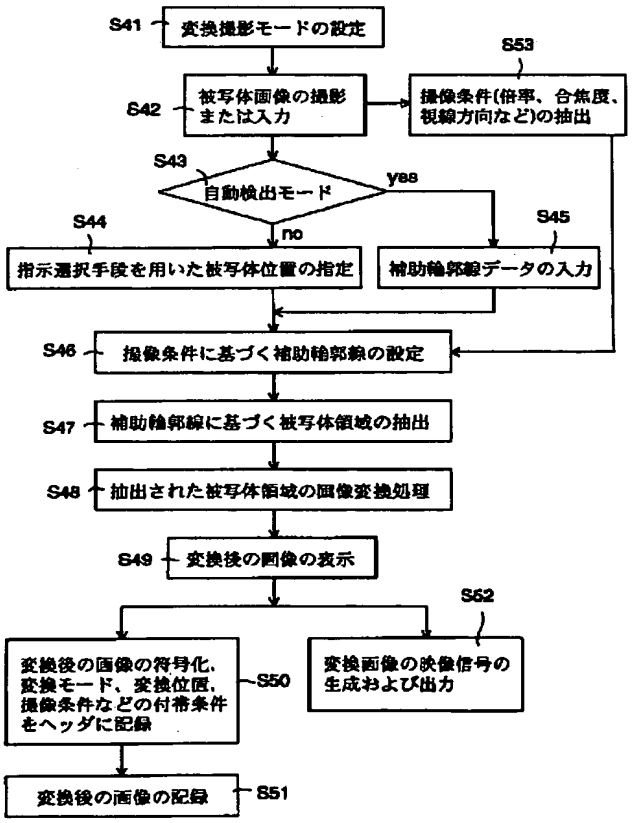
【図１０】


24
50a
50b
158
154
40
戻る
次へ
補助輪郭表示
40a
拡大
44
縮小
46
40b
40c
156
48

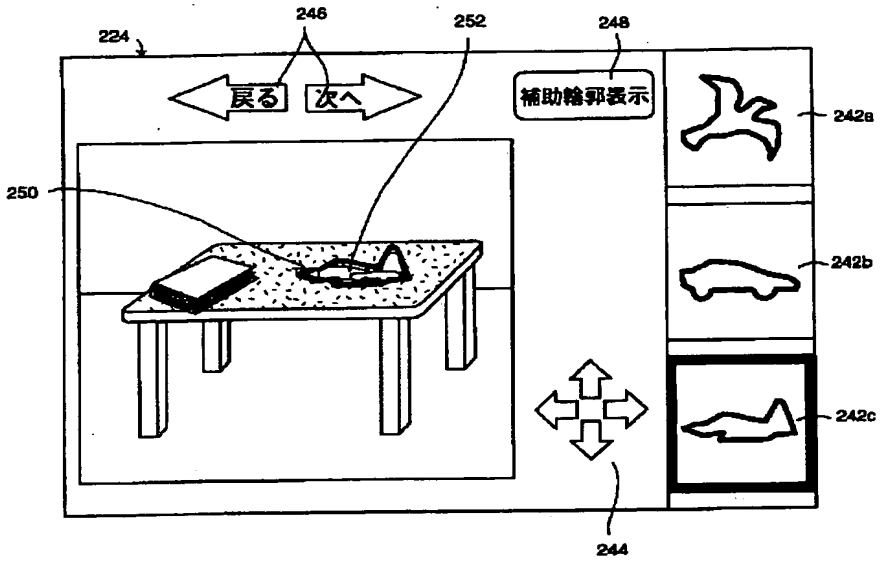
【図１２】


210a
210b
224
表示ディスプレイ
表示ディスプレイ
224b
212
結像光学系
214
撮像素子
234
画像出力
218
映像信号処理
記憶
画像変換
238
被写体抽出
236
220
画像符号化
232
計測制御
216
制御
記録媒体
ストロボ
228
222
230
撮影モード設定
240
指示選択
226

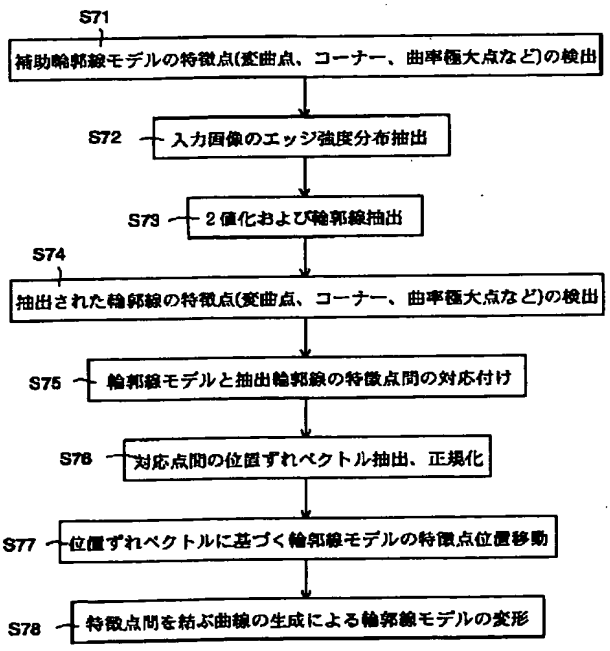
【図１３】


S41
変換撮影モードの設定
S53
S42
被写体画像の撮影または入力
撮像条件(倍率、合焦度、視線方向など)の抽出
S43
自動検出モード
yes
no
S44
S45
指示選択手段を用いた被写体位置の指定
補助輪郭線データの入力
S46
撮像条件に基づく補助輪郭線の設定
S47
補助輪郭線に基づく被写体領域の抽出
S48
抽出された被写体領域の画像変換処理
S49
変換後の画像の表示
S52
変換後の画像の符号化、変換モード、変換位置、撮像条件などの付帯条件をヘッダに記録
S50
変換画像の映像信号の生成および出力
変換後の画像の記録
S51

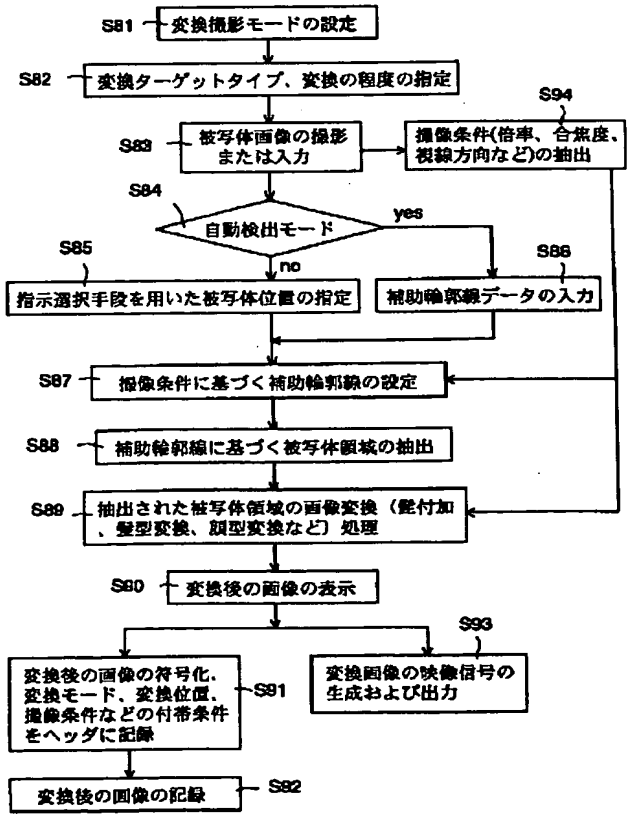
【図１４】


224
246
252
248
戻る
次へ
補助輪郭表示
242a
250
242b
242c
244

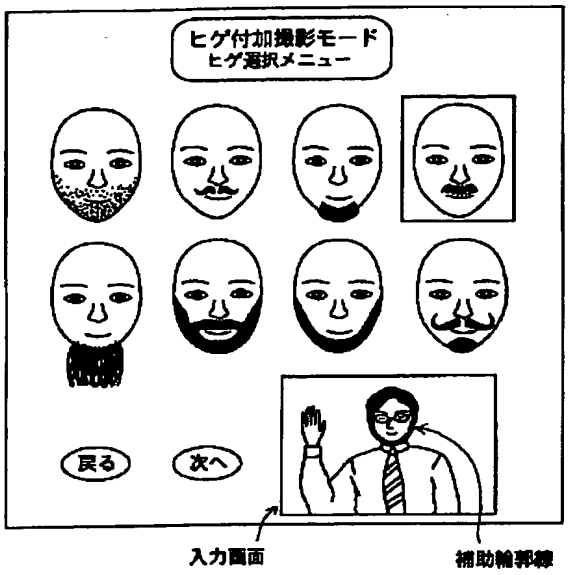
【図１６】


S71
補助輪郭線モデルの特徴点(変曲点、コーナー、曲率極大点など)の検出
S72
入力画像のエッジ強度分布抽出
S73
２値化および輪郭線抽出
S74
抽出された輪郭線の特徴点(変曲点、コーナー、曲率極大点など)の検出
S75
輪郭線モデルと抽出輪郭線の特徴点間の対応付け
S76
対応点間の位置ずれベクトル抽出、正規化
S77
位置ずれベクトルに基づく輪郭線モデルの特徴点位置移動
S78
特徴点間を結ぶ曲線の生成による輪郭線モデルの変形

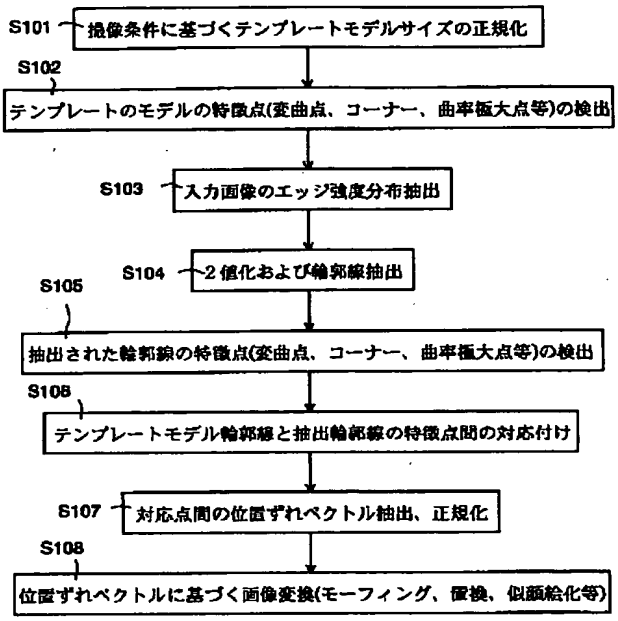
【図１８】


S81
変換撮影モードの設定
S82
変換ターゲットタイプ、変換の程度の指定
S94
S83
被写体画像の撮影または入力
撮像条件(倍率、合焦度、視線方向など)の抽出
S84
自動検出モード
yes
no
S85
S86
指示選択手段を用いた被写体位置の指定
補助輪郭線データの入力
S87
撮像条件に基づく補助輪郭線の設定
S88
補助輪郭線に基づく被写体領域の抽出
S89
抽出された被写体領域の画像変換（陰付加、疑型変換、顔型変換など）処理
S90
変換後の画像の表示
S93
変換後の画像の符号化、変換モード、変換位置、撮像条件などの付帯条件をヘッダに記録
S91
変換画像の映像信号の生成および出力
変換後の画像の記録
S92

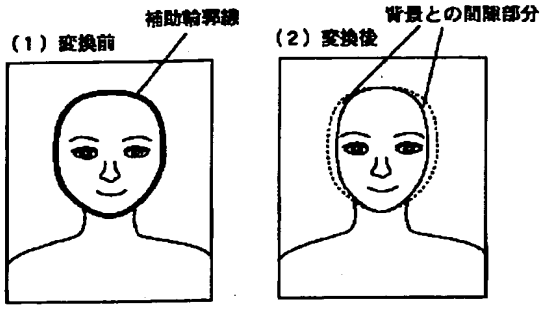
【図１９】



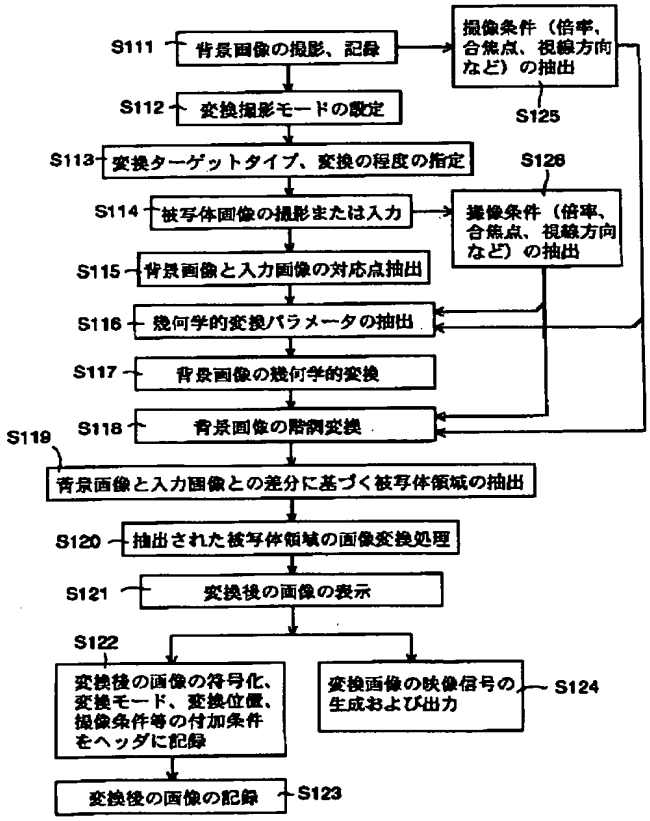
【図２１】



【図２２】



【図２３】



フロントページの続き

(72)発明者　高橋　史明
東京都大田区下丸子３丁目30番２号キヤノン株式会社内

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CA12 CA16 CB01 CB08 CB12
CB16 CB19 CC03 CD02 CD05
CD11 CE05 CE08 CE09 CE17
CE20 CG01 CH08 CH09 CH11
CH18 DA07 DA08 DA16 DA17
DB02 DB06 DB09 DC04 DC05
DC07 DC08 DC16 DC17 DC36
5C076 AA02 AA14 AA17 AA18 AA19
AA21 AA22 AA23 AA26 AA27
AA32 AA40 BA06 BB32 CA02
CA10 CA11 CA12 CB02
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(71)Applicant : CANON INC
(72)Inventor : MATSUGI MASAKAZU
KONDO TOSHIAKI
TAKAHASHI FUMIAKI

(30)Priority
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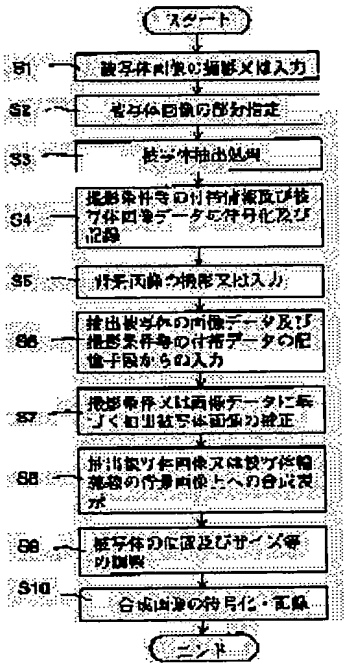
(54) DEVICE AND METHOD FOR PROCESSING IMAGE AND STORAGE MEDIUM

(57)Abstract:
PROBLEM TO BE SOLVED: To synthesize an extracted object with a background image.
SOLUTION: A user photographs images including the object to be extracted (S1), specifies an extraction range by using an instruction selection device or the like (S2) and performs extraction by an object extraction circuit (S3). The image data of an extracted object area are compression-encoded and stored in a storage device together with a photographing condition (S4). Then, the background image is photographed or inputted (S5). While displaying the background image, the previously extracted object image is read from the storage device (S6). The gradation and color tone of the object image are adjusted so as to suppress the difference of the gradation and the color tone, etc., between the background image and the object image (S7), the object is mixed and smoothed with the background image near a contour and the object image is subscribed on the background image, synthesized and displayed (S8). The position and size of the object image are adjusted corresponding to the instruction of the user (S9). Synthetic image data are recorded in a recording medium (S10).



LEGAL STATUS
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[Kind of final disposal of application other than the examiner's decision of rejection or

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CLAIMS

[Claim(s)]

[Claim 1] An image processing system characterized by providing the following. An image input means including image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means A directions selection means for making directions selection of the particular part of an inputted image An image-processing means It is a synthetic image generation means has an image coding means, an image-recording means, image-recording data medium, and an image-display means, and compound the background image memorized by either a specific photographic subject extract means extract the specific photographic subject in said image using the image information of the portion by which directions selection was made with said directions selection means in an image into which said image-processing means was inputted, said storage means and said image-recording data medium, and said specific photographic subject which were extracted.

[Claim 2] An image processing system characterized by providing the following. An image input means including image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means A directions selection means for making directions selection of the particular part of an inputted image An image-processing means It has an image coding means, an image recording means, a communications control means, image recording data medium, and an image display means. Said image-processing means A specific photographic subject extract means to extract a specific photographic subject in said image using image information of a portion by which directions selection was made with said directions selection means in an inputted image, A synthetic image generation means to compound an input means of a background image through said communications control means, and said background image and said extracted specific photographic subject

[Claim 3] Said control signal generating means is an image processing system according to claim 1 which inputs an auxiliary data about a configuration and a location of said specific photographic subject from said storage means, and displays said auxiliary data on said image display means.

[Claim 4] Said control signal generating means is an image processing system according to claim 2 which inputs an auxiliary data about a configuration and a location of said specific photographic subject from said communications control means, and displays said auxiliary data on said image display means.

[Claim 5] It is the image processing system which it has the following, and said image format-conversion

means changes into a predetermined format an image memorized by either said storage means and said image-recording data medium, and is characterized by for said image-processing means to perform specific photographic subject extract processing in an inputted image, and to compound an extracted specific photographic subject image and an image by which format conversion was carried out with said image format conversion means. An image input means including image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means An image-processing means An image format conversion means An image coding means, an image recording means, image recording data medium, and an image display means

[Claim 6] Have the following and said control signal generating means has a photography condition measurement control means. Said image coding means encodes image data, and records photography conditions by said photography condition measurement control means in a predetermined format with encoded image data on either [at least] said record medium or said storage means. Said image-processing means is an image processing system characterized by compounding an image which performed specific photographic subject extract processing in an inputted image, and was recorded on either [at least] an extracted specific photographic subject image, said storage means or said image recording data medium based on said photography conditions. An image input means including image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means An image-processing means An image coding means An image recording means, image recording data medium, and an image display means

[Claim 7] Said auxiliary data is an image processing system according to claim 3 or 4 which it is in a border line of predetermined size about said specific photographic subject, and any of mask data.

[Claim 8] Said auxiliary data is an image processing system according to claim 3 or 4 which is the border line of a predetermined configuration.

[Claim 9] On the other hand, said photography conditions are an image processing system of light exposure and shutter speed according to claim 6 which includes the direction of a look in the amount of focuses, a photography scale factor, and a class list of illumination light at least.

[Claim 10] Said image-processing means is an image processing system according to claim 1, 2, 5, or 6 which performs synthetic processing of an image after performing predetermined transform processing to some [at least] fields of one image based on a difference between photography conditions at the time of photography of an inputted image, and photography conditions of said background image so that one image may carry out abbreviation coincidence with photography conditions of an image of another side.

[Claim 11] Said control signal generating means is an image processing system according to claim 6 to which an auxiliary data about a configuration and a location of said specific photographic subject is inputted into from said storage means, and a configuration and a location of this auxiliary data are changed based on said photography conditions.

[Claim 12] An image-processing method characterized by providing the following A step which inputs an image from a predetermined image input means Inputted measurement or a setting step of an image input condition of an image A step which records said image input condition on a predetermined storage means The image composition step which performs generation processing of the synthetic image of an image of a photographic subject this extracted based on a photographic subject extract step which extracts a specific photographic subject from an inputted image, and said image input condition, and the **** image recorded on a predetermined storage means, and the image output-control means step which

perform the output to record or the predetermined display means by predetermined format to the predetermined storage means of said synthetic image

[Claim 13] A record medium characterized by memorizing program software of procedure characterized by providing the following A step which inputs an image from a predetermined image input means Inputted measurement or a setting step of an image input condition of an image A step which records said image input condition on a predetermined storage means The predetermined storage means of the synthetic image obtained by the image composition step which compounds the image of the photographic subject extracted based on a photographic subject extract step which extracts a specific photographic subject from an inputted image, and said image input condition, and the background image recorded on a predetermined storage means, and said image composition step and the record by the predetermined format at least to one side of a record medium, or the image output-control means step that performs the output to a predetermined display means

[Claim 14] Have the following and said image-processing means the 2nd image inputted by the 1st image data recorded on either said record medium or said storage means, and said image input means It is the image processing system characterized by said control signal generating means generating a control signal which displays a synthetic image obtained by said image-processing means on said image display means by compounding using either [at least] an image input condition of said 2nd image, or an image input condition of said 1st image. An image input means including image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means An image-processing means An image coding means An image recording means, image recording data medium, and an image display means

[Claim 15] An image-processing method characterized by providing the following A step which inputs an image from a predetermined image input means A display for a predetermined display means and a selection step of the 1st image recorded on either a predetermined storage means or image recording data medium An image composition step which compounds the 1st selected image and an input image Record by predetermined format for a predetermined storage means of a synthetic image obtained at said image composition step, or an image output-control means step which performs an output to a predetermined display means

[Claim 16] A record medium which memorizes program software of procedure characterized by providing the following A step which inputs an image from a predetermined image input means A display for a predetermined display means and a selection step of the 1st image recorded on either a predetermined storage means or image recording data medium An image composition step which compounds the 1st selected image and an input image Record by predetermined format for a predetermined storage means of a synthetic image obtained at said image composition step, or an image output-control means step which performs an output to a predetermined display means

[Claim 17] An image processing system characterized by providing the following. An image input means An image display means to display the 1st image inputted by said image input means A specific region extract means to extract a specific region in said input image using image information of a portion by which directions selection was made with said directions selection means within a directions selection means which makes directions selection of the portion of a request of said 1st image, and said 1st image An image composition means to be extracted by said specific region extract means and to compound an image of said specific region with the 2nd image

[Claim 18] An image processing system according to claim 17 with which said image input means includes image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means.

[Claim 19] An image processing system according to claim 17 with which said image input means possesses means of communications which captures an image through communication media.

[Claim 20] An image processing system possessing a format conversion means to change a format of image data from said communication media into a predetermined format according to claim 19.

[Claim 21] Furthermore, an image processing system possessing an auxiliary display means to display auxiliary line drawing with which assignment of said specific region to extract is assisted on the 1st [said] image displayed by said image display means according to claim 17.

[Claim 22] Said auxiliary line drawing is an image processing system according to claim 21 which is the border line of predetermined size which shows said specific region to extract.

[Claim 23] Said auxiliary line drawing is an image processing system according to claim 21 drawn according to mask data in which said specific region to extract is shown.

[Claim 24] An image processing system according to claim 17 which said image input means inputs the photography condition with said 1st image, said image composition means is extracted by said specific region extract means, adjusts an image of said specific region according to said photography conditions, and is compounded with the 2nd image.

[Claim 25] Said photography conditions are an image processing system containing any one of a class of light exposure, the amount of focuses, a photography scale factor, and illumination light, and the directions of a look according to claim 24.

[Claim 26] Said image composition means is an image processing system according to claim 17 or 24 which performs synthetic processing of an image after one image performs predetermined transform processing to some [at least] fields of an image based on a difference between photography conditions of said 1st image, and photography conditions of said 2nd image so that while may carry out abbreviation coincidence with photography conditions of an image of another side.

[Claim 27] An image processing system according to claim 17 characterized by providing the following Furthermore, an auxiliary-data storage means to memorize an auxiliary data about a configuration and a location of a specific photographic subject which were extracted from said 1st image An auxiliary-data amendment means to change a location and size of an auxiliary data memorized by said auxiliary-data storage means according to photography conditions of said 1st image An auxiliary display means to display auxiliary line drawing based on an auxiliary data amended by said auxiliary-data amendment means on the 1st [said] image displayed by said image display means

[Claim 28] An image-processing method characterized by providing the following An image input step which inputs an image from a predetermined image input means A measurement setting step which measures or sets up an image input condition of an inputted image An input condition storage step which memorizes said image input condition for a predetermined storage means An image composition step which compounds an image of a photographic subject extracted at said photographic subject extract step based on a photographic subject extract step which extracts a specific photographic subject from an inputted image, and said image input condition, and a **** image recorded on a predetermined storage means, and a synthetic image output step which outputs a synthetic image obtained at said image composition step

[Claim 29] An image-processing method according to claim 28 that said synthetic image output step is a step which records said synthetic image on a record medium.

[Claim 30] A storage characterized by memorizing program software which performs an image-processing method according to claim 28, enabling free external read-out.

[Claim 31] An image input means including image formation optical system, a photo-electric-conversion means, a video signal processing means, a storage means, and a control signal generating means, It has an image display means in an image-processing means, an image coding means, an image recording means, and an image recording data-medium list. Said image-processing means the 2nd image inputted by the 1st image data recorded on either said record medium and said storage means, and said image input means It is the image processing system which compounds using at least one of an image input condition of said 2nd image, and the image input conditions of said 1st image, and is characterized by said control signal generating means generating a control signal which displays a synthetic image obtained by said image display means with said image-processing means.

[Claim 32] A display for a predetermined display means and a selection step of the 1st image recorded on a step which inputs an image from a predetermined image input means, a predetermined storage means, and either of image recording data medium, An image-processing method characterized by consisting of an image output step which performs an output to record or a predetermined display means by predetermined format in an image composition step and a list which compound said 1st selected image and input image to a predetermined storage means of a synthetic image by said image composition step.

[Claim 33] A storage characterized by memorizing program software which performs an image-processing method according to claim 32, enabling free external read-out.

[Claim 34] An image processing system characterized by providing an image transformation means to perform predetermined conversion to an image of the object domain concerned an image input means, an image pick-up condition extract means, an image transformation mode setting means, a field extract means to ask for a predetermined object domain using the image pick-up conditions concerned from an input image, and among the input images concerned.

[Claim 35] An image processing system characterized by providing the following. An image input means An image display means An image pick-up condition extract means An image transformation mode setting means, a field setting means to set up a predetermined object domain based on the image transformation mode concerned or the image pick-up conditions concerned from an input image, a boundary layer display means to superimpose a boundary line of a setting field on an input image, and to display on the image display means concerned, and an image transformation means to perform predetermined conversion to an image of a background region except an object domain or the object domain concerned concerned among the input images concerned

[Claim 36] An image processing system characterized by providing an image input means, an image pick-up condition extract means, an image transformation mode setting means, a field extract means to ask for a predetermined object domain from an input image based on the image pick-up conditions concerned or the image transformation mode concerned, and an image transformation means to perform predetermined conversion to an image of a background region excluding an object domain or the object domain concerned concerned among the input images concerned.

[Claim 37] Said image transformation means is an image processing system according to claim 34, 35, or 36 characterized by performing predetermined texture-mapping processing to said object domain based

on said image pick-up conditions or said image transformation mode.

[Claim 38] an image of others [means / predetermined in said image transformation means / storage] -- inputting -- said object domain -- said image pick-up conditions or said image transformation mode -- being based -- being concerned -- others -- an image processing system according to claim 34, 35, or 36 characterized by replacing by image.

[Claim 39] Said image transformation means is an image processing system according to claim 34, 35, or 36 characterized by changing a specific color component of said object domain into other color components.

[Claim 40] Said image transformation means is an image processing system according to claim 34, 35, or 36 characterized by performing predetermined geometric deformation to said object domain.

[Claim 41] Said image transformation means is an image processing system according to claim 34, 35, or 36 characterized by adding predetermined watermark information to image data after conversion.

[Claim 42] difference of a background image into which said field extract means was inputted beforehand, and said input image -- an image processing system according to claim 34 or 36 characterized by asking for said object domain based on data.

[Claim 43] Said field extract means is an image processing system according to claim 34 or 36 characterized by providing a storage means of a predetermined template model image, a similarity detection means of a template model and said input image concerned, and a field extract means to extract a field where the similarity concerned serves as beyond a predetermined threshold or the maximum.

[Claim 44] Said image transformation means is an image processing system according to claim 34, 35, or 36 characterized by changing an intensity level or a color component value based on image pick-up conditions about a part of said object domain or said background region.

[Claim 45] Said field extract means is an image processing system according to claim 34 or 36 characterized by what a boundary line of an extract field is superimposed on an input image, and is displayed on said image display means.

[Claim 46] Said field setting means is an image processing system according to claim 35 characterized by having a location or a size-change means of the field concerned.

[Claim 47] Said field extract means is an image processing system according to claim 43 characterized by setting up a location and size in said input image of said template model image based on said image pick-up conditions, and asking for a border line of said object domain by making a border line of the set-up template model image concerned into an initial outline.

[Claim 48] Said border-line display means is an image processing system according to claim 35 characterized by displaying said boundary line when a display action of a border line is chosen by predetermined display selection means.

[Claim 49] An image-processing method characterized by providing an image transformation step which performs predetermined conversion to an image of the object domain concerned an image input step, an image pick-up condition extract step, an image transformation mode setting step, a field extract step that asks for a predetermined object domain using the image pick-up conditions concerned from an input image, and among the input images concerned.

[Claim 50] An image-processing method characterized by providing the following. An image input step An image pick-up condition extract step An image transformation mode setting step A field setting step which sets up a predetermined object domain based on the image transformation mode concerned or the image pick-up conditions concerned from an input image, a boundary layer display step which

superimposes a boundary line of a setting field on an input image, and is displayed on a screen of an image display means, and an image transformation step which performs predetermined conversion to an image of a background region except an object domain or the object domain concerned concerned among the input images concerned

[Claim 51] An image-processing method characterized by providing the following. An image input step A <TXF FR=0002 HE=250 WI=080 LX=1100 LY=0300> image-pick-up condition extract step An image transformation mode setting step A field extract step which asks for a predetermined object domain from an input image based on the image pick-up conditions concerned or the image transformation mode concerned, and an image transformation step which performs predetermined conversion to an image of a background region except an object domain or the object domain concerned concerned among the input images concerned

[Claim 52] Said image transformation step is the image-processing method according to claim 49, 50, or 51 characterized by performing predetermined texture-mapping processing to said object domain based on said image pick-up conditions or said image transformation mode.

[Claim 53] an image of others [means / predetermined in said image transformation step / storage] -- inputting -- said object domain -- said image pick-up conditions or said image transformation mode -- being based -- being concerned -- others -- an image-processing method according to claim 49, 50, or 51 characterized by replacing by image.

[Claim 54] Said image transformation step is the image-processing method according to claim 49, 50, or 51 characterized by changing a specific color component of said object domain into other color components.

[Claim 55] Said image transformation step is the image-processing method according to claim 49, 50, or 51 characterized by performing predetermined geometric deformation to said object domain.

[Claim 56] Said image transformation step is the image-processing method according to claim 49, 50, or 51 characterized by adding predetermined watermark information to image data after conversion.

[Claim 57] difference of a background image into which said field extract step was inputted beforehand, and said input image -- an image-processing method according to claim 49 or 51 characterized by asking for said object domain based on data.

[Claim 58] Said field extract step is the image-processing method according to claim 49 or 51 characterized by providing a similarity detection step which detects similarity of a template model memorized by storage means and said input image, and a field extract step which extracts a field where the similarity concerned serves as beyond a predetermined threshold or the maximum.

[Claim 59] Said image transformation step is the image-processing method according to claim 34, 35, or 36 characterized by changing an intensity level or a color component value based on image pick-up conditions about a part of said object domain or said background region.

[Claim 60] Said field extract step is the image-processing method according to claim 49 or 50 characterized by what a boundary line of an extract field is superimposed on an input image, and is displayed on said image display means.

[Claim 61] Said field setting step is the image-processing method according to claim 50 characterized by having a step which changes a location or size of the field concerned.

[Claim 62] Said field extract step is the image-processing method according to claim 58 characterized by setting up a location and size in said input image of said template model image based on said image pick-up conditions, and asking for a border line of said object domain by making a border line of the set-up

template model image concerned into an initial outline.

[Claim 63] Said border-line display step is the image-processing method according to claim 50 characterized by displaying said boundary line when a display action of a border line is chosen by predetermined display selection means.

[Claim 64] A storage characterized by memorizing program software which performs an image-processing method according to claim 49.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to a storage at the image processing system and method list which have photographic subject logging and an image composition function.

[0002]

[Description of the Prior Art] With image pick-up equipment, as the flexibility of processing processing of image information improves with digitization of signal processing conventionally inside equipment From comparatively simple processing of conversion of an intensity level or a color tone, color balance adjustment, quantization size conversion, etc. Things which added the image-processing function, such as an edge extract function and a thing which has the photographic subject extract function (pp.13 - 1994 [a television society technical report, Vol.18, / 18 or]) of a color component using the grown method serially, are proposed variously.

[0003] moreover, those difference after controlling light exposure in the method of extracting an image based on difference with a background image so that average luminance becomes proper at the time of the image pick-up of a background image and picturizing a subject-copy image using the same set point as a background image -- the configuration which extracts an object image based on data is known (for example, refer to JP,6-253197,A).

[0004] The technology shown below is known as the picture transmission which performs processing which is different from an input image to a specific region and other fields, or imaging technique. For example, it has the extract means of a specific object domain, and the technology of changing the coding property or transmission characteristic (the existence of transmission of a specific region being included.) etc. is indicated by JP,5-145914,A, JP,5-336374,A, JP,6-319130,A, JP,7-222048,A, JP,7-230554,A, and JP,7-250312,A by the image data of the portion which serves as image data of the field for [, such as a person,] specification, and a background from an input image.

[0005] Moreover, two or more fields are started from an image, the image transmission equipment equipped with a means to compound them by arrangement of arbitration is indicated by JP,7-298238,A, and the equipment which has a photographic subject extract means, the signal-processing parameter-control means about a photographic subject and a background or a processing circuit, and a substitute circuit is indicated by JP,5-110936,A, JP,6-169425,A, JP,6-225328,A, and JP,8-154259,A.

[0006]

[Problem(s) to be Solved by the Invention] Since the conventional image processing system which has a photographic subject extract function aimed at carrying out the separation extract of the photographic subject under specific photography conditions, when it performed edit processing processing of images with the background prepared separately besides the trouble that it is difficult to extract a photographic subject for a general background, such as image composition, it had the following problems. That is, at the time of photography, it cannot judge whether the style of the photographic subject which carried out the separation extract suits the composition of a background image etc., and unless it is at the synthetic time, it is not known. Moreover, if whenever [photography condition for example, lighting conditions exposure condition scale-factor, and focus] etc. differ, by the way, it will be necessary to become very unnatural and a synthetic image with sense of incongruity, and to add processing of conversion of a color tone, or gradation amendment between the background image which the user prepared separately, and the extracted photographic subject image.

[0007] This invention aims at showing the image processing system and method list which canceled such un-arranging a storage.

[0008] The conventional example of a publication does not tend to process some of those with a thing aiming at gathering coding effectiveness in an image pick-up system or a picture transmission system, and images into JP,5-145914,A etc.

[0009] The conventional example indicated by JP,7-298238,A extracts and compounds the rectangle field in an image, and cannot perform processing which specialized in the photographic subject portion of an arbitration configuration etc.

[0010] The conventional example indicated by JP,5-110936,A and JP,6-225328,A sets up the range of brightness, a hue, or the color difference as an extraction condition, since it considers that the portion which fulfills this condition is a photographic subject, in the combination of the background color of arbitration, and a photographic subject, a desired photographic subject field cannot be extracted and processing processing of it cannot be carried out.

[0011] Although a photographic subject is extracted in the video camera indicated by JP,6-169425,A based on the color or the intensity level of a video signal of a photographic subject portion to which it superimposes on the image of a photographic subject, a marker is displayed on the predetermined location in the display screen of a viewfinder, and a marker is located in it, a user needs to adjust and photo a field angle so that a marker and a desired photographic subject may lap, and he is very troublesome, and operability is bad, therefore extract precision of a photographic subject is bad.

[0012] By measuring a person's flesh color, JP,8-154259,A presumes a person's existence region, extracts the person image, and lacks in versatility.

[0013] Thus, it was difficult to perform semi-automatically image processing of adding a predetermined shading off or deformation to the main photographic subject or the background of having an arbitration configuration in an image, or the color scheme of arbitration, in the conventional example by automatic or simple actuation.

[0014] This invention aims at showing the image processing system and method list which cancel such un-arranging a storage.

[0015] This invention aims at showing the image processing system and method list which make it possible to perform automatically or semi-automatically image processing of adding a predetermined shading off or deformation to the main photographic subject or the background of having an arbitration

configuration in an image, or the color scheme of arbitration again a storage.

[0016]

[Means for Solving the Problem] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, A directions selection means for making directions selection of the particular part of an image input means including a storage means and a control signal generating means, and an inputted image, It has an image display means in an image-processing means, an image coding means, an image recording means, and an image recording data-medium list. A specific photographic subject extract means to extract a specific photographic subject in an image using image information of a portion by which directions selection was made with a directions selection means in an image into which an image-processing means was inputted, It is characterized by having a background image memorized by a storage means or image recording data medium and a synthetic image generation means to compound this extracted specific photographic subject.

[0017] This inputs a photographic subject image including a background of arbitration (photography), and actuation with simple generating a synthetic image of a background image and a photographic subject which are different from a background in a photographic subject image after extracting a photographic subject in it can realize. Moreover, by displaying a compounded image on an image display means, a location and magnitude of a photographic subject in a synthetic image can be checked, and after a directions selection means adjusted them further and taking a background and suitable matching, a synthetic image can be recorded, saved or outputted.

[0018] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, A directions selection means for making directions selection of the particular part of an image input means including a storage means and a control signal generating means, and an inputted image, It has an image display means in an image-processing means, an image coding means, an image recording means, a communications control means, and an image recording data-medium list. A specific photographic subject extract means to extract a specific photographic subject in an image using image information of a portion by which directions selection was made with a directions selection means in an image into which an image-processing means was inputted, It is characterized by having an input means of a background image through a communications control means, and a background image and a synthetic image generation means to compound an extracted specific photographic subject.

[0019] Thereby, in addition to the above-mentioned feature, a background image is inputted from the outside, and actuation with simple composition with a photographic subject in a **** image and a photographic subject image including a background of arbitration can realize.

[0020] In this invention, a control signal generating means inputs an auxiliary data about a configuration and a location of a specific photographic subject from a storage means, and it is characterized by displaying an auxiliary data on an image display means. By this, when a configuration or a style, a location, etc. of a photographic subject have become settled in general beforehand, by inputting the data (for example, border line of a rectangle frame or a photographic subject model same type etc.), and displaying on an input image in piles When a posture of a photographic subject in a photographic subject image etc. can be adjusted so that the auxiliary data may be suited in a site of image inputs, such as photography, activation of a body-ed extract is attained without performing partial assignment of an

image for a photographic subject extract by directions selection means.

[0021] In this invention, a control signal generating means inputs an auxiliary data about a configuration and a location of a specific photographic subject from a communications control means, and it is characterized by displaying an auxiliary data on an image display means. Thereby, in addition to said feature, an auxiliary data can be inputted from the outside of an image pick-up image-processing means.

[0022] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, An image input means, an image-processing means including a storage means and a control signal generating means, It has an image display means in an image coding means to have an image format conversion means, an image recording means, and an image recording data-medium list. An image format conversion means within an image coding means An image memorized by a storage means or image recording data medium is changed into a predetermined format. An image coding means changes a format of predetermined image data recorded on a storage means or image recording data medium. An image-processing means It is characterized by performing specific photographic subject extract processing in an inputted image, and carrying out image composition of an extracted specific photographic subject image and the image by which format conversion was carried out with an image format conversion means.

[0023] In an image-processing means equipped with a photographic subject extract which has by this the feature mentioned above, and an image composition processing facility, since a transform-processing means to a format suitable for image composition processing for the interior was built in, the selection range of a format of image data inputted can be extended sharply.

[0024] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, An image input means, an image-processing means including a storage means and a control signal generating means, It has an image display means in an image coding means, an image recording means, and an image recording data-medium list. A control signal generating means has a photography condition measurement control means, and an image coding means encodes image data. Photography conditions are recorded on a record medium or a storage means in a predetermined format with encoded image data. It is characterized by an image-processing means compounding an image (background) which performed specific photographic subject extract processing in an inputted image, and was recorded on an extracted specific photographic subject, a storage means, or image recording data medium based on photography conditions.

[0025] Thereby, after performing gray scale conversion etc. based on photography conditions, a natural synthetic image which lost an extracted difference among photography conditions of an image and a background image of a photographic subject is obtained automatically.

[0026] In this invention, an auxiliary data is characterized by being a border line or mask data of predetermined size about a specific photographic subject. When a photographic subject configuration has become settled in general by this, a photographic subject extract can be automatically performed by obtaining a posture or a style of a photographic subject etc. which suited an auxiliary data in a site of an image input (photography), and extracting a field inside an auxiliary border line by displaying the border line or its contrant region on an input image in piles (special display of coloring etc.). Furthermore, when a background of a background image and a photographic subject image is mostly in agreement, precision of a photographic subject extract improves sharply.

[0027] In this invention, an auxiliary data is characterized by being the close border line of a

predetermined configuration. Even if it does not approximate a configuration of a photographic subject, as mentioned above, when a background of a background image and a photographic subject image is mostly in agreement, precision of a photographic subject extract improves sharply by specifying a photographic subject field with a very rough configuration given by close border lines, such as a rectangle reflecting the size in every direction, or an ellipse.

[0028] In this invention, photography conditions are characterized by including a class and the direction of a look of light exposure or shutter speed, the amount of focuses, a photography scale factor, and illumination light. It is because a difference among these photography conditions is absorbed between a photographic subject image and a background image and a natural synthetic image is obtained. In addition, the direction of a look is used for assignment of a field that a photographic subject only exists etc.

[0029] In this invention, an image-processing means performs synthetic processing of an image, after one image performs predetermined transform processing to some [at least] fields of an image based on a difference between photography conditions at the time of photography of an inputted image, and photography conditions of a background image so that while may carry out abbreviation coincidence with photography conditions of an image of another side. A natural image can be obtained, when one gradation, color tone, contrast, or sharpness of an image etc. is changed based on photography conditions and it compounds with an image of another side by this.

[0030] In this invention, a control signal generating means inputs an auxiliary data about a configuration and a location of a specific photographic subject from a storage means, and is characterized by changing a configuration or a location of an auxiliary data based on photography conditions. Since the features (a configuration of a border line, contrast, etc.) of an auxiliary data can be automatically changed proper according to photography conditions of an input image even when [from which photography conditions (a scale factor, lighting conditions exposure conditions etc.) when inputting a background image (photography) and photography conditions at the time of an input of a photographic subject image differ by this] case or changing, it can simplify and subsequent photographic subject extract processing can be performed.

[0031] A step into which an image-processing method concerning this invention inputs an image from a predetermined image input means, Measurement or a setting step of an image input condition of an inputted image, a step which records an image input condition on a predetermined storage means, A photographic subject extract step which extracts a specific photographic subject from an inputted image, an image composition step which compounds an image of a photographic subject extracted based on an image input condition, and a background image recorded on a predetermined storage means, It is characterized by consisting of an image output-control means step which performs an output to record or a predetermined display means by predetermined format for a predetermined storage means of a synthetic image obtained at an image composition step.

[0032] Thereby, it is not concerned with a difference or fluctuation of an image input condition, but image composition with a specific photographic subject in a predetermined input image and a background image is made to a natural thing. Moreover, as long as the procedure is followed, image composition stabilized without being based on configuration is attained.

[0033] This invention is characterized by to provide an image transformation means or a step which performs predetermined conversion to an image of a background region except an object domain or an object domain an image input means or a step, an image pick-up condition extract means or a step, an

image transformation mode setting means or a step, a field extract means or a step that asks for a predetermined object domain using image pick-up conditions from an input image, and among input images. Thereby, a partial configuration of a photographic subject can certainly be specified from image pick-up conditions etc., and image pick-up equipment or a picture input device which can add and picturize desired conversion can be realized.

[0034] This invention An image input means, an image display means, and an image pick-up condition extract means, An image transformation mode setting means and a field setting means to set up a predetermined object domain based on the image transformation mode concerned or the image pick-up conditions concerned from an input image, It is characterized by providing a boundary layer display means to superimpose a boundary line of a setting field on an input image, and to display on an image display means, and an image transformation means to perform predetermined conversion to an image of a background region excluding an object domain or an object domain among input images. This invention is characterized by to provide an image input step, an image pick-up condition extract step, an image-transformation mode-setting step, the field setting step that sets up a predetermined object domain based on the image-transformation mode concerned or the image pick-up conditions concerned from an input image, the boundary layer display step which superimposes a boundary line of a setting field on an input image, and display on an image-display means, and the image-transformation step which perform predetermined conversion to the image of the background region excluding an object domain or an object domain among input images. Photography from which a photographic subject is changed in a field which corresponds after checking by looking a field where a conversion field according to a photographic subject could be set up automatically, and a user was set up by this, or an image input which can check an image after conversion is realized.

[0035] Moreover, this invention is characterized by to provide the image-transformation means or the step which performs predetermined conversion to the image of the background region excluding an object domain or an object domain among a field extract means or a step which asks for a predetermined object domain, and input images based on an image input means or a step, an image pick-up condition extract means or a step, an image-transformation mode-setting means or a step, and the image pick-up conditions concerned or the image-transformation mode concerned. [image / input] An image input can be carried out, after being able to extract a field of a photographic subject from an image automatically based on image pick-up conditions etc. and changing a request to the extract field by this.

[0036] In this invention, an image transformation means or a step is characterized by performing predetermined texture-mapping processing to an object domain based on image pick-up conditions or image transformation mode. Moreover, an image transformation means inputs other images from a predetermined storage means, and is characterized by changing an object domain by other images based on image pick-up conditions or image transformation mode. By these, an image input means by which a specific region according to image pick-up conditions or image transformation mode is convertible is offered.

[0037] Moreover, an image transformation means or a step is characterized by changing a specific color component of an object domain into other color components. An image input means by which a color component of an object domain pinpointed using image pick-up conditions etc. is automatically convertible by this is realizable.

[0038] In this invention, an image transformation means or a step is characterized by performing

predetermined geometric deformation to an object domain. An image input means by which geometric deformation of affine transformation etc. can be added to an object domain pinpointed using image pick-up conditions etc. by this is realizable.

[0039] In this invention, it is characterized by an image transformation means or a step adding predetermined watermark information to image data after conversion. Thereby, information, such as a field for a transducer and a translation mode, is recordable in not being visually perceived with an image. Furthermore, after treatment of restoring an image before conversion based on such information can perform simply.

[0040] difference of a background image and an input image into which a field extract means or a step was beforehand inputted in this invention -- it is characterized by asking for an object domain based on data. Thereby, a field for conversion can be pinpointed automatically.

[0041] In this invention, a field extract means is characterized by providing a field extract means to extract a field where similarity serves as a storage means of a predetermined template model image, and a similarity detection means of a template model and an input image with below a predetermined threshold or the maximum. A field extract step is characterized by providing a similarity detection step which detects similarity of a template model and an input image which are memorized by storage means, and a field extract step which extracts a field where similarity serves as below a predetermined threshold or the maximum. Thereby, while changing template size appropriately using image pick-up conditions etc., a picture input device which can pinpoint a field for conversion automatically as a high field of a template configuration and similarity is realizable.

[0042] In this invention, an image transformation means or a step is characterized by performing conversion of an intensity level or a color component value based on image pick-up conditions about a part of object domain or background region. A picture input device which can specify and carry out image transformation of the portion which should be changed beforehand by this in a field pinpointed as a candidate for conversion is realizable.

[0043] In this invention, a field extract means or a step is characterized by what a boundary line of an extract field is superimposed on an input image, and is displayed on said image display means. Thereby, a user can perform image transformation photography, after checking the range of an extracted field.

[0044] In this invention, a field setting means or a step is characterized by having a location or a size-change means of a field. Conversion photography which can adjust set-up a location or size of a conversion field simply by this can be performed.

[0045] In this invention, a field extract means or a step sets up a location and size in an input image of a template model image based on image pick-up conditions, and it is characterized by asking for a border line of an object domain by making a border line of a set-up template model image into an initial outline. Even if it is the photographic subject which has a border line which is somewhat different from a configuration specified with a template model by this, conversion photography which can perform image transformation automatically about a field inside a right border line is attained.

[0046] In this invention, it is characterized by displaying the border line, when a display action of a border line is chosen by border-line display means or display selection means predetermined in a step. Thereby, conversion (or the reverse) in conversion photography mode from photography mode, a check for conversion, etc. can usually be performed.

[0047]

[Example] Hereafter, the example of this invention is explained to details with reference to a drawing.

[0048] Drawing 1 shows outline configuration block drawing of the 1st example of this invention. The image formation optical system 12 in which the image pick-up image processing system 10 includes a taking lens and the drive controlling mechanism for zoom photography, an image sensor 14 like CCD series, the measurement control circuit 16 which measures and controls an image pick-up parameter, the video signal processing circuit 18, storage 20, control of image pick-up actuation, Control of image pick-up conditions, The control signal of an image processing and an image output The control signal generating circuit 22, EVF to generate (Electronic view finder) etc. ·· in the directions selecting arrangement 26 which consists of the display display 24, a pen mold key, or a cross-joint key etc. which makes a finder serve a double purpose, stroboscope luminescence equipment 28, a record medium 30, the image coding network 32, the image output circuit 34, the photographic subject extract circuit 36, and a list The image composition circuit 38 is provided.

[0049] An image pick-up parameter measurement control circuit 18 possesses the control signal generating circuit which generates the control signal of video signal properties, such as a gamma property, a knee property, and color balance, in the light-exposure control circuit which controls the scale-factor detector which detects the scale factor of the zoom lens which can change a photography scale factor freely, the focus condition detector which detects the focus condition on the image pick-up side of an image sensor 14, the charge storage time of an image sensor 14, and/or the diameter of a opening of drawing of the image-formation optical system 12, a stroboscope luminescence control circuit, and a list. These parts are realized by software. An image pick-up parameter includes the direction of a look, the existence of stroboscope luminescence, the classes (for example, daylight, a fluorescent lamp, an incandescent lamp, stroboscope light, etc.) of illumination light, etc. other than whenever [photography scale-factor and focus], and light exposure. The direction of a look is detected by the look detection equipment (not shown) built in the video signal processing circuit 18.

[0050] The video signal processing circuit 18 has amendment circuits, such as gamma, a knee, and a white balance, an automatic focus (AF) circuit, an automatic-exposure-control (AE) circuit, an automatic-gain-control (AGC) circuit, etc.

[0051] The directions selecting arrangement 26 consists of a pen mold key, a cross-joint key, etc. However, the touch panel is united with the display display 24, and when the panel for actuation is displayed on the screen of the display display 24, the displayed panel for actuation becomes one gestalt of the directions selecting arrangement 26.

[0052] A record medium 30 consists of various data medium, such as disk media, such as a magnetic tape, an optical disk, or a magneto-optic disk, a flash memory, and an IC memory. In this example, a record medium 30 is not limited to special data medium. A record medium 30 can be freely detached and attached to the image pick-up image processing system 10.

[0053] The image coding network 32 carries out compression coding of the image data in a predetermined format with incidental data, such as photography conditions.

[0054] With reference to drawing 2 , the extract of the photographic subject which is characteristic actuation of this example, and a synthetic process with a background image are explained.

[0055] A user photos an image including the photographic subject which should be extracted (S1), and extracts the field image in which a photographic subject exists by the photographic subject extract circuit 36 using the directions selecting arrangement 26 etc. (S2, S3). For example, several [on the border line of

the photographic subject of the input image displayed on the display display 24] are directed with the directions selecting arrangement 26, and the reference point of a photographic subject extract is set as the photographic subject extract circuit 36. The photographic subject extract circuit 36 performs an edge trace to which between adjacent data is connected by the predetermined method, and obtains the border line of the photographic subject as one closed curve. Edge data can be obtained space differential filtering processing of SOBEL, Laplacian, etc. by the well-known method to an input image. Thus, the image of the field inside the closed curve obtained is extracted as a photographic subject image (S3). The extract method of the closed curve equivalent to the outline of a photographic subject is not limited to the method mentioned above.

[0056] Compression coding is carried out by the predetermined compression method (for example, compression coding method using a wavelet transformation, DCT conversion, etc.), and the image data of the extracted photographic subject field is stored in storage 20 in a predetermined format with photography conditions, such as a photography scale factor and exposure conditions (charge storage time of an image sensor, existence of stroboscope luminescence, etc.), (S4).

[0057] Next, a background image is photoed or inputted (S5). The photographic subject image extracted previously is read from storage 20 or a record medium 30, displaying a background image (S6). The gradation and the color tone of a photographic subject image are adjusted (S7), and mixing with a background image and smoothing of a photographic subject near an outline are performed, and it compounds so that a photographic subject image may be overwritten at a background image, and displays on the screen of the display display 24 so that differences, such as gradation by the difference among the photography conditions between a background image and a photographic subject image and a color tone, may be controlled (S8). In order to gather the display speed of the display display 24, it may be made to perform amendment processing depending on photography conditions at the time of record of a synthetic image.

[0058] Drawing 3 shows the example of the display screen of the display display 24. The photographic subject image display fields 40a, 40b, and 40c which display three photographic subject images obtained as a result of extract processing on the display display 24, The synthetic image display field 42, the expansion carbon button 44 which directs an enlarged display, the contraction carbon button 46 which directs a reduced display, the navigation key 48 which directs migration on four directions, return key which directs return to pretreatment 50a, and delivery key 50b which directs the next processing or subsequent ones are displayed.

[0059] According to directions of a user, the location and size of a photographic subject image are adjusted (S9). At this time, the auxiliary frame 52 which expresses the size and the location of a photographic subject roughly is displayed to surround the photographic subject image on a synthetic image. Highlighting of the selected photographic subject image (image displayed on photographic subject image display field 40a in drawing 3) is carried out by **** etc. so that it may turn out to be it. Such an expression method is common knowledge. Drawing 4 shows the synthetic example which detached and added a little still more nearly same photographic subject image. Since a photographic subject image becomes large as a result, the auxiliary frame 52 in which the location and size of a photographic subject image are shown is larger than the case of drawing 3 .

[0060] A user operates the expansion carbon button 44, the contraction carbon button 46, and the navigation key 48 for repositioning with a touch pen, a mouse, or a finger, and can change the size and the

location of a photographic subject image. The graphical user interface using such carbon buttons itself is common knowledge. Although it is needless to say, such a manual operation button etc. may be set as the predetermined location on the surface of the main frame. It can return to a front processing phase by return carbon button 50a, and can shift to the next processing phase by stepper-button 50b.

[0061] A user judges that it is in the suitable arrangement and the size in a background image the size of the extracted photographic subject image, and as a result of adjustment of a location, if a user pushes the synthetic record carbon button on a control panel, compression coding will be carried out and synthetic image data (of course, the auxiliary frame 52 is removed.) will be recorded on storage 20 or a record medium 30 (S10). In the case of this record, the photography conditions used for the synthetic image generate time may be encoded as incidental information, and you may record on the header unit of an image data file etc. As incidental information, parameters, such as the center-of-gravity location of the rectangle frame (for example, auxiliary frame 52 of drawing 3) circumscribed to the coordinate of each point on the border line of the photographic subject portion at the time of synthetic record and its border line other than photography conditions and size in every direction or a center-of-gravity location of the ellipse circumscribed to the border line, size of the main shaft, a direction, and an ovality, may be included.

[0062] Apart from a synthetic image, the incidental information about such a configuration of a photographic subject, a location, and size can be read by next photography, and can also be displayed on the display display 24 in piles as an auxiliary data at an image. By doing in this way, the time and effort which a photographic subject extract takes in a series of processings from the extract of a photographic subject to perform to composition with a background about a photographic subject of the same kind can be saved.

[0063] After drawing 5 indicates the border line of an extract photographic subject image by superposition previously at a background image and adjusts the location and size of a photographic subject image, it shows the modification flow chart which compounded the photographic subject image. S11-S15 are the same as S1-S5 of drawing 2 . The border line of an extract photographic subject image is indicated by superposition at a background image (S16), and the location and size of a photographic subject image are adjusted (S17). Then, extract photographic subject image data and incidental information data are inputted, a photographic subject image is compounded to a background image, as it enters into a border line (S18), a photographic subject image is amended according to photography conditions etc. (S19), and a synthetic image is recorded on a record medium 30 (S20).

[0064] In addition, when the background in a background image and the photographic subject image before extract processing is performed is almost the same, even if the image field which should be extracted contains a part for a background to some extent, if it removes a changed part produced according to factors, such as a difference among photography conditions, it hardly poses a problem at the time of composition. Therefore, it cannot be overemphasized that in such a case a photographic subject may be roughly extracted and used including a background with a rectangle frame, an ellipse, etc. as mentioned above.

[0065] Therefore, automatic extracting of the field which corresponds in the rectangle frame 54 of an applicable part when the image which removes an unnecessary person or an unnecessary body by photographic subject extract processing, and is obtained at the time of photography, i.e., the image with which a certain field was missing as shown in drawing 6 , is used as the 1st image, next a **** image is photoed may be carried out, and the 1st image may be compounded so that the image field for a

background after removal may be filled up. Photographic subject image 40c of drawing 6 extracts the image in the rectangle frame 54, and is obtained. Also in this case, a synthetic result is displayed on a display means, and with directions of a user, a synthetic result image is encoded and it records on a predetermined record medium.

[0066] Next, the 2nd example of this invention is explained. In the 2nd example, the image (the 1st image: don't ask an animation or a still picture.) prepared beforehand is captured through a record medium or means of communications of a main part etc. which can be detached and attached, and it compounds with the image (the 2nd image: don't ask an animation and a still picture.) photoed on the spot, and the synthetic image obtained as a result is recorded on the record medium or storage of a main part, or is outputted outside. Drawing 7 shows outline configuration block drawing of the example. The same sign is given to the same component as drawing 1 . As for the record medium which 140 can detach and attach freely, and 142, a communications control circuit and 144 are image data format conversion circuits. In case the image data format conversion circuit 144 changes into a predetermined content-type the image data of various formats inputted through communications control circuit 142 grade and outputs image data outside through the communications control circuit 142, it is changed into external predetermined format from a content-type.

[0067] In this example, when the 1st image is a photographic subject image with which logging was already performed, the 1st image is compounded with the 2nd image (background image), without performing photographic subject extract processing mentioned above after the input of the 1st image. In addition, photographic subject extract processing may be performed to the 2nd image, and you may compound with the 1st image.

[0068] As the gestalt of the image inputted from the outside through the communications control circuit 142, and a class of image For example, a document image, a photograph, etc. of file format which were transmitted from the external terminal which goes via TV or a video image, the telephone line, etc., It is various, and although this example is not limited to either, data format presupposes that it is the image data transmitted to the list with other wireless or cables from image input devices (a digital camera, a scanner, FAX, etc.) a well-known thing. Similarly, what is necessary is just the thing of the format common knowledge of the classification of the image data recorded on a record medium 140.

[0069] In this example, the data format which can be inputted is defined beforehand and a user chooses from them. the video signal with which coded-image data was treated as input data format, the classification was specifically judged at the time of an input (an automatic judging or manual judging by the user), and it was encoded [DPCM] -- or the file format by which predetermined was encoded is identified. The image data by which run length coding was carried out [MR / (MODIFAIDO lead) / DPCM coding or] as a video signal, The thing of animation correspondences as a file format, such as MPEG and QuickTime (trademark of U.S. Apple Computer, Inc.), Bit map format, such as JPEG, TIFF, BMP/DIB, and GIF, PICT, PCX, It can incorporate with the data stream of the printer represented by three-dimension scene symbolic conventions for rendering applications, such as RIB, and PCL, and spreadsheet image formats, such as XLS, can be inputted into drawing data format, such as bit image format and other PPT, and a list.

[0070] The inputted image data is decrypted, and after an error correction is carried out, a format is changed into it by the fixed format (bit map format, such as TIFF, BMP/DIB, or JPEG, is typical.) which suits an internal image processing if needed.

[0071] The 1st image is a dynamic image, and when extracting a photographic subject from one of them and compounding with the 2nd image (background image), one frame which the user chose is changed into the data format of a static image.

[0072] The 1st image is a dynamic image by which the photographic subject extract was already carried out, and in the case of animation format, the 2nd image also prepares the keying signal generating said way and the synthetic circuit as a part of image-processing means inside a main part, generates a keying signal about the photographic subject field in the 1st image in it, and may compound a photographic subject image (foreground image) and a background image to it with an animation.

[0073] With reference to drawing 8 , the actuation and procedure of an example which are shown in drawing 7 are explained. First, a user chooses three kinds of one, a photography input, a communication link input, and a data-medium input, as image input mode of the 1st image (S21), stores in storage 20 the image inputted in the appointed image input mode (S22), and displays on the display disk play 24 (S23). While specifying a communication configuration or the source in a communication link input, inputting image data between 1 scheduled time or the number of fixed sheets by a predetermined protocol or a predetermined correspondence procedure and memorizing to storage 20, it displays on the display display 24. In a data-medium input, a list of the record image of a record medium 140 is displayed, the image of 1 or two or more requests is chosen as it from the inside, and it reads into storage 20. A display and selection of the image after taking a photograph also in a photography input are the same.

[0074] A user chooses one suitable image frame or a series of dynamic-image frames from the image displayed on a display 24 (S24), and stores in storage 20 as the 1st image (S25).

[0075] The photographic subject image which a user should use the directions selecting arrangement 26 when photographic subject extract processing is not yet made to the 1st image, and he should extract from the 1st image is specified, and the photographic subject extractor 36 extracts a photographic subject image by the same processing as a previous example (S26). The location and size of a photographic subject image to a background image are adjusted (S27). At this time, it specifies whether a background image is overwritten and a photographic subject image is displayed or in order not to lower the display speed to the display display 24, only the border line of a photographic subject image is displayed on a background image in piles. A means for that is the same as that of the example explained previously, and is good.

[0076] When the photography condition is attached to the photographic subject image and/or the background image as incidental information, like the 1st example, based on the difference among photography conditions, one gradation, color tone, etc. of an image are changed so that it may agree with the image of another side mostly (S28), a synthetic image is generated (S29), and it records on a record medium 140 (S30).

[0077] In addition, when the class and exposure conditions of the illumination light are not attached to image data as photography conditions, it enables it for a manual to adjust gradation and/or a color tone (S31-33). Even if photography conditions are attached to image data, this can be used also when it cannot be satisfied with automatic amendment of gradation and a color tone. If the slide bar 150 for lightness conversion (or carbon button) and the slide bar 152 for saturation conversion (or carbon button) are displayed on a display panel and a user specifically operates which slide bar (or carbon button) 150,152 so that it may be set as manual adjustment mode (S31) and may illustrate to drawing 9 , the color tone and contrast (or lightness and saturation) of a photographic subject image portion will be adjusted (S32). Of course, after specifying the particular part of a photographic subject, the color tone etc. can also be

adjusted. If a user checks a synthetic result and inputs record directions (S33), a synthetic image will be recorded on a record medium 130 (S30).

[0078] Thus, simple actuation can generate a natural synthetic image and it can record in the site of photography.

[0079] In each above-mentioned example, you may record on storage 20 or a record medium 30,140 at the photographic subject border line obtained as an extract processing result of a photographic subject, or its border line by using as auxiliary border-line data the rectangle frame data which carries out abbreviation circumscription. As shown in drawing 10 , when the auxiliary outline display carbon button 154 is formed in a display panel and the carbon button 154 is pushed, the control signal generating circuit 22 reads the auxiliary border-line data from storage 20 or a record medium 30,140, and makes an input image display in piles as an auxiliary border line 156 on the screen of the display display 24. The photographic subject image 158 surrounded by the auxiliary border line 156 does not need to be in agreement with photographic subject image 40c.

[0080] If the set-up photography conditions (especially a photography scale factor, the direction of a look, etc.) are changed; this will be interlocked with and the size location and configuration of the auxiliary border line 156 will be changed automatically. In this case, if the size A of a proper is beforehand given to the photographic subject as incidental information, the size on the screen decided by photography conditions, such as a photography scale factor and photographic subject distance (it presumes from whenever [focus] etc.) of an outline, will be calculated, and the auxiliary border line 156 will be displayed on the display display 24 in the magnitude which suits that size.

[0081] For example, in a focal distance, if distance from the 2nd principal point location of A and image formation optical system to an image sensor side is set [the gap from the maximum of f and focus level] to v for dp and the standard size of a photographic subject, the photographic subject size S on a screen will be given by the bottom formula. namely, $\cdots S=A(v-f)(1+(v-f)\,dp/f)/f$ (1)

However, fluctuation of photographic subject distance and fluctuation of focus signal level consider as linearity. Therefore, what is necessary is just to change the size of an auxiliary data according to scale-factor S/A based on a formula (1), if dp is measured and it asks for f from a lens location.

[0082] Moreover, a user resets an auxiliary data as a suitable location using the directions selection means 26 if needed, and may correct the size etc.

[0083] The photographic subject extract technology used in the above-mentioned example is explained. Generally it indicates by setting in the suitable location on an input image by making an auxiliary border line (or mask data as field data inside an auxiliary border line) into an initial outline (or initial field), and the following photographic subject logging processings are performed by making it into an initial data.

[0084] Specifically, the method of using a dynamic outline as the base is used (331 D.Terzopoul M.Kass, A.Witkin, os, "Snakes:Active Contour Models", lnternational Journal of Computer Vision, pp.321- 1988). A dynamic outline method is a method of extracting an objective outline from edge information, and an initial border line is completed as the outline on a body by transforming a border-line model so that the energy performance index which meant as a constraint that an outline is smooth, that it was on an edge, etc. may serve as min. Moreover, it is based on a difference with the characteristic quantity of the image of the near field of for example, an initial outline, and the image about the local field of a photographic subject portion as concrete technique into which this was developed. The technique of making the inner sense or outward external force act on the point on the outline of a dynamic outline is known. (For

example) R. Ronfard and "Region-Based Strategies for Active Contour Models" and International Journalof Computer Vision and pp.229- 251 and 1994 -- and dynamic "outline extract based on description of field obtained from clustering" Institute of Electronics, Information and Communication Engineers paper magazine D-II besides Eito, vol.J75-D-II, and pp.1111- 1119, 1992, etc.

[0085] Although especially the technique of image logging is not limited, an initial outline configuration is the method that logging can be performed, automatically in the conditions which approximate a photographic subject configuration well, and the above-mentioned method has it at this point. [desirable]

[0086] Rough assignment (for example, a closed curve or a rectangle frame surrounding an object etc.) about the location and magnitude for logging may be performed, and you may record beforehand with an image as incidental data. After treatment performs image logging or image composition on other terminals after photography termination. Moreover, the image data inside a border line is extracted as it is, and it may compound with a background image and you may record.

[0087] Drawing 11 shows outline configuration block drawing of the 3rd example of this invention. The image formation optical system 212 in which the image pick-up image processing system 210 includes a taking lens and the drive controlling mechanism for zoom photography, an image sensor 214 like CCD series, the measurement control circuit 216 which measures and controls an image pick-up parameter, the video signal processing circuit 218, storage 220, control of image pick-up actuation, Control of image pick-up conditions, The control signal of an image processing and an image output The control circuit 222, EVF to generate (Electronic view finder) etc. -- a finder The display display 224 made to serve a double purpose, a pen mold key Or photography mode setting equipment 240 is provided in the directions selecting arrangement 226 which consists of a cross-joint key etc., stroboscope luminescence equipment 228, a record medium 230, the image coding network 232, the image output circuit 234, the photographic subject extract circuit 236, the image transformation circuit 238, and a list.

[0088] Equipment 210 is divided into main part 210a and image-processing section 210b, the photographic subject extract circuit 236, the image transformation circuit 238, and display display 224b are held in image-processing section 210b, and you may make it hold the remainder in main part 210a, as shown in drawing 12 .

[0089] The touch panel is united with the display display 224, and when the panel for actuation is displayed on the screen of the display display 224, the displayed panel for actuation becomes one gestalt of the directions selecting arrangement 226.

[0090] A video signal processing circuit 218 possesses the control signal generating circuit which generates the control signal of video signal properties, such as a gamma property, a knee property, and color balance, in the light-exposure control circuit which controls the scale-factor detector which detects the scale factor of the zoom lens which can change a photography scale factor freely, the focus condition detector which detects the focus condition on the image pick-up side of an image sensor 214, the charge storage time of an image sensor 214, and/or the diameter of a opening of drawing of the image-formation optical system 212, a stroboscope luminescence control circuit, and a list. These parts are realized by software. An image pick-up parameter includes the direction of a look, the existence of stroboscope luminescence, the classes (for example, daylight, a fluorescent lamp, an incandescent lamp, stroboscope light, etc.) of illumination light, etc. other than whenever [photography scale-factor and focus], and light exposure. The direction of a look is detected by the look detection equipment (not shown) built in the

image pick-up image processing system 210.

[0091] The video signal processing circuit 218 has amendment circuits, such as gamma, a knee, and a white balance, an automatic focus (AF) circuit, an automatic-exposure-control (AE) circuit, an automatic-gain-control (AGC) circuit, etc.

[0092] Storage 220 becomes ROM and the list which store the processing program used for a frame buffer, a Video RAM, the template data used for conversion photography, and image transformation from other primary storage means.

[0093] A record medium 230 consists of various data medium, such as disk media, such as a magnetic tape, an optical disk, or a magneto-optic disk, a flash memory, and an IC memory. In this example, a record medium 230 is not limited to special data medium. A record medium 230 can be freely detached and attached to the image pick-up image processing system 210.

[0094] The image coding network 232 carries out compression coding of the image data in a predetermined format with incidental data, such as photography conditions.

[0095] In this example, a request can be automatically processed in a photography image at the time of photography. This is called conversion photography mode on these specifications. conversion photography mode -- bloodshot-eyes amendment mode, mustached removal mode, and silverfish -- there is removal/addition mode of a freckle etc. About size, a location, etc. in the screen of a photographic subject, if it is selectable and there is no assignment from a user especially at this example about the 2 of automatic detection mode and manual setting mode modes to one, as for a user, automatic detection mode shall be set up.

[0096] In this example, it shall record and prepare for storage 220 or image recording data medium 230 beforehand at the model border line belonging to a photographic subject category, or its border line by using as auxiliary border-line data the border-line coordinate data of the frame of the predetermined configurations (a rectangle or ellipse) which carry out abbreviation circumscription. Moreover, what consists of a partial border line showing the category for an extract of a configuration as a model border line, for example, the model which consists of a partial feature element indicated by JP,7-320086,A by the same applicant as this application, may be used.

[0097] The auxiliary border-line (above-mentioned model border line) data which has the size set up by the method of mention later based on photography conditions, such as a scale factor and photographic subject distance, is scanned sequentially from the edge on a screen, whenever [with the edge intensity distribution of an input image / coincidence] (for example, correlation value) is evaluated in automatic detection mode in each location, and it asks for the maximum location of whenever [coincidence] as an optimal location. Thus, even if it is a case as two or more extract object domains are included, automatic activation of two or more detection and field extracts of the location of a photographic subject field can be carried out.

[0098] The contents of each translation mode are explained briefly. mustached removal (addition) mode and silverfish -- in freckle removal mode, a person's head or face is first detected from an input image.

[0099] It is good by the method of detecting the location where a standard template image (a shade image or color picture) is used for others, it is changed into suitable size as detection processing of a face or an eye based on photography conditions, a correlation value is calculated [location] in each location in an image, and correlation serves as max or the maximum.

[0100] in manual setting mode, a control circuit 222 is shown below -- as -- auxiliary border lines (border

line of the face displayed with a closed curve etc.) -- the screen top of a display 224 -- displaying -- the inside of the auxiliary border line -- outline ****** -- like, a user adjusts image pick-up conditions, such as a scale factor and a line of sight, or the location and size of an auxiliary border line are changed.

[0101] In the bloodshot-eyes amendment in automatic detection mode, the eye in an input image is detected and the pixel equivalent to bloodshot eyes is alternatively changed into black etc. The details of this processing are mentioned later. I display on the screen of a display 224 by making the model border line (both eyes or one eye) of an eye into an auxiliary border line, and have a user set up image pick-up conditions in manual setting mode.

[0102] In mustached removal mode, the beige component of a face is extracted after detection of a face field, and the field pixel of black or off-white is changed beige except for the hair in a face in the field to which a mustache may exist.

[0103] silverfish -- in freckle removal mode, the representation color component value of the beige component of a face is extracted after detection of a face field, and the pixel value of the field which has an especially different color component from a beige representation color component value in each field of a cheek, a jaw, and a frame in a face is changed into the color component value of a representation color.

[0104] Each above mode changes the particular part of a photographic subject, and it is necessary to pinpoint the range for conversion in a high precision. With reference to drawing 13 , the details of the extract process of a photographic subject field and the image transformation process of a photographic subject portion are explained.

[0105] A user sets up conversion photography mode with photography mode setting equipment 240 first (S41). An image including the photographic subject set as the object of conversion is photoed after conversion photography mode setting (S42), and automatic detection mode or manual setting mode is distinguished (S43).

[0106] In the case of manual setting mode (S43), the location where a photographic subject exists with the photographic subject extractor 236 using the directions selecting arrangement 226 etc. is specified (S44). For example, in using a pen type thing as a directions selecting arrangement 2269, it directs the point equivalent to the reference points (center of a face etc.) of the photographic subject of the input image displayed on the display display 224 with the pen. It is good also considering the location of the direction of a look which detects with a look detection means and is acquired as a reference point.

[0107] in the case of automatic detection mode (S43), it is shown in (drawing 14 -- as --) -- a control circuit 222 reads auxiliary border-line data from storage 220 or a record medium 230 (S45). Furthermore, the auxiliary border line 250 (drawing 14) may be displayed on an input image in piles centering on a reference point location on the screen of the display display 224. This display action may be made to be started by pushing the carbon button 248 (drawing 14) for an auxiliary outline display. As mentioned above, this auxiliary border line is a border line of the face expressed with a closed curve etc., and shows the outline configuration of the field which should be changed etc. That is, it differs from the marker who only shows the target location.

[0108] Corresponding to the set-up photography conditions (especially a scale factor, the direction of a look, etc.), according to the fluctuation, a control circuit 222 is set up automatically and changes the size, location, or configuration of auxiliary border-line data (S46). In this case, the size A of a proper shall be beforehand given to the photographic subject as incidental information, and a control circuit 222 calculates the auxiliary-data size on a screen from photography conditions, such as a scale factor and

photographic subject distance (from whenever [focus] etc. to presumption) of an outline, changes it into suitable size, and is displayed on the display display 224 as a close border line. For example, in a focal distance, if distance from the second principal point location of A and image formation optical system to the image pick-up side of an image sensor 214 is set [the gap from the maximum of f and focus level] to v for dp and the standard size of a photographic subject, the photographic subject size S on a screen will be given by the following formula. namely, -- S=A(v-f) {1+(v-f) dp/f}/f (2)

However, suppose that fluctuation of photographic subject distance and fluctuation of focus signal level are linearity.

[0109] Therefore, what is necessary is just to change the size of an auxiliary data by measuring dp and asking for f by lens location measurement etc. according to scale-factor S/A based on a formula (2). It cannot be overemphasized that photographic subject distance may be presumed with other means (for example, ranging means using a laser beam etc.).

[0110] The photographic subject extractor 236 makes an auxiliary border line (or mask data as field data inside an auxiliary border line) an initial outline (initial field), sets it as the suitable location on an input image, and performs extract processing of a photographic subject field by making it into an initial data (S47). However, when manual setting mode is chosen, the set-up interior of an auxiliary border line is extracted as a photographic subject field. When for example, bloodshot-eyes amendment mode is set up as photography mode, the rectangle which includes the both eyes of the portrait image corresponding to the configuration border-line model or standard photography distance of both eyes as an auxiliary border line, and has size comparable as the gap of both eyes is used.

[0111] In this example, the method which made **-SU the dynamic outline method indicated by JP,9-185719,A by the same applicant as this application is used. A dynamic outline method is the method of completing it as the outline on a body by transforming a border-line model so that a border-line model (initial outline: it is equivalent to an auxiliary border line in this example.) may be given and the energy performance index which meant as a constraint that it was on that an outline configuration is smooth and an edge etc. may serve as min.

[0112] Since outline coincidence of an auxiliary border line and the border line of the photographic subject which should be extracted can be automatically carried out by changing the size about an auxiliary border line etc. based on image pick-up conditions, the photographic subject field by the complexity of the image pattern for a background and the complexity of a photographic subject configuration which should be changed ** can be extracted to a high speed and stability.

[0113] Thus, after extracting the field inside the border line (closed curve) obtained automatically as a photographic subject field, in a photographic subject field, '1' and binary mask data which are set to '0' except [its] are generated. Image transformation equipment 238 performs transform processing according to conversion photography mode to the image belonging to a mask field (for example, a mask value is the field of '1') (S48).

[0114] For example, when bloodshot-eyes amendment mode is set up as photography mode, bloodshot-eyes amendment processing is performed to the pixel of the red component of the extracted field. As shown in drawing 15 , it searches for the pixel which contains many red components which are specific colors in a mask field (S61), and, specifically, the connection field is extracted (S62). And it is a field contiguous to the connection field, a representation color component is extracted from the set of the pixel which is within the limits of planned color components, such as black or tea, (S63), and the color

component value of the corresponding pixel is changed into representation colors (black etc.) (S64). It is the pixel which does not define beforehand the color component value permitted as a representation color, but is near the corresponding pixel, and although it has the color component value of non-red and non-white, color component values (for example, brown, blue, or a golden component etc.) may be used. You may change uniformly so that it may have the color component value beforehand set up in the red component pixel in a mask field, without extracting a connection field.

[0115] bloodshot-eyes amendment mode and silverfish -- an example of the automatic processing (it corresponds to extract processing of the field which should be pinpointed by S47 of drawing 13 .) which can pinpoint the field for the transducer used in common with freckle removal mode, mustached removal mode, etc. is explained with reference to drawing 16 . Here, an auxiliary border line shall be given as a target border-line model which should be changed, and as mentioned above, based on image pick-up conditions, such as a scale factor and photographic subject distance, a scaling shall be made beforehand.

[0116] First, the point which corresponds as the focus of a border-line model to one of classification, such as the point of inflection, a corner, and the curvature maximum point, is extracted (S71), and each classification and location are recorded. This data may be beforehand given as incidental data of a border-line model.

[0117] The edge intensity distribution of an input image are searched for by filtering accompanied by space derivation, such as Sobel, Prewitt, or Canny, (S72). The acquired edge intensity distribution are made binary with a predetermined threshold, processing of the maximum location trace of thinning or edge intensity distribution etc. is added if needed, and border-line data is extracted (S73).

[0118] The focus (and the classification) is detected like model data from the extracted border line (S74), between the focus between both border-lines data is matched (S75), and the location gap vector between corresponding points is extracted (S76). Since this location gap vector gives the relative displacement centering on a center of gravity, that amount of offset is made to serve as zero, and it normalizes (S76).

[0119] The displacement corresponding to location gap vector quantity is given to each focus (S77), spline interpolation etc. generates the curve which connects between the focus adjoined after migration, and a border-line model is transformed (S78).

[0120] It cannot be overemphasized that matching between curves is not limited to the method mentioned above, and other methods may be used.

[0121] Thus, it is the pinpointed field which is obtained and where the field inside the border line (closed curve) of the border-line model which deformed is set as the object of image transformation. Furthermore, you may amend using other technique, such as a dynamic outline method, if needed. Desired image transformation is automatically performed to a photography image (output image of an image sensor 214) ** [according to / the complexity of the configuration of a portion to be changed etc.] by above-mentioned matching processing and pinpointing of a deformation field.

[0122] After above photographic subject field extracts and image transformation processings, a coding network 232 carries out compression coding of the image after conversion (S50), and records on a record medium 230 (S51). The image output signal generating circuit 234 generates and outputs video signals (NTSC system or PAL system) from the image after conversion simultaneous in be fastidious (S52).

[0123] In the graphics format outputted from a coding network 232, incidental information, such as image pick-up conditions, photography time, compressibility, and a compression method, is recorded on a header or the incidental information data file created separately by the existence of activation of image

transformation, conversion photography mode, a conversion location, auxiliary border-line data, and the list if needed, for example. An example of the expression method about the record format of these items is shown in drawing 17 .

[0124] Incidental information may record on an image that it cannot perceive visually as electronic watermark data (Proc of the IEEE, vol.83, pp.944-957.1995). For example, the least significant bit showing image data is assigned as a write-in bit of these data, and there are methods, such as embedding into the edge portion in an image. In this case, especially the border line for a transducer can be superimposed and recorded on image data.

[0125] In this example, photographic subject image 242c used as the photographic subject 252 of drawing 14 and the model for an extract does not necessarily need to be in agreement. It is because it can ask for the border line of a right photographic subject by a dynamic outline method etc.

[0126] Although image transformation was performed to the extracted object domain in this example, it cannot be overemphasized that image transformation may be carried out to reverse at a part for the background. This is the same also about the following examples.

[0127] With the configuration shown in drawing 12 , image pick-up conditions, image data, a model border line, etc. may be supplied to the photographic subject extract circuit 236 after photography, image pick-up conditions may be utilized, and image transformation which asked for and mentioned the conversion field above may be performed. In this case, image-processing section 210b separated from main part 210a is realizable by computer. The function of the photographic subject extract circuit 236 and the image transformation circuit 238 is realized by the program of the procedure shown in drawing 13 , drawing 15 , etc.

[0128] Next, the example which performs geometric transform processing or substitute processing to the predetermined image portion set up or extracted by the method shown in the above-mentioned example to the input image is explained. The flow chart of an overall procedure is shown in drawing 18 . Drawing 18 is the same as the processing flow fundamentally shown in drawing drawing 13 except for a setup in conversion photography mode.

[0129] the target transform processing (S89 of drawing 18) be substitute processing to the parts image data by which each part be beforehand prepared for deformation of each part, such as processing which fatten or dwindle an image field about the parts (an arm, leg, etc.) of for example, hairstyle conversion, mustached addition conversion, facial form conversion, portrait-izing, a face, or the body or all the bodies, an eye which be the component of a face, a nose, and opening, or modification of the geometry between each part, and a list etc.

[0130] In this example, the type which set up conversion photography mode (S81), and set up that degree after that with the classification of conversion which was mentioned above, or was further subdivided of the same conversion categories is chosen (S82).

[0131] The photographic subject field used as the candidate for conversion is extracted (S88), and transform processing which suits the configuration for conversion well is performed after that using the size of image pick-up conditions or an extract field etc. (S89).

[0132] A mustached addition translation mode is the so-called processing which carries out texture mapping (see the "ray-tracing" Ohm-Sha ** written by Shin-ichi Takemura) about the image data of the preselected mustache in the predetermined location of the face in an image. An example of a selection screen mustached type when the conversion photography mode of mustached addition is set as drawing

19 is shown. A list of the mustached image according to type is displayed, and a user chooses one of them using the directions selecting arrangement 240. For example, the frame which surrounds an image using a cross-joint key is moved, and a non-illustrated confirmation button is pushed and chosen. The input image is displayed on the subwindow at the lower right of a screen. If the 'following' carbon button displayed on a screen is pushed after choosing a mustached type, as shown in drawing 20 , a processing result will be displayed on a display. When a user pushes a confirmation button etc., finally conversion photography (the video signal of an resolution picture is outputted [encoding an resolution picture and recording on a record medium] to the exterior) is completed. The texture data of a mustached image is performed as mustached texture mapping is mapped by suitable size and a suitable location using the configuration of a formula (2) and an extract field.

[0133] In a facial form translation mode, so-called morphing or substitute between the face image data which should serve as a face image in an input image and a target etc. is performed. Facial form conversion is automatically performed using the model which consists of a partial feature element indicated by JP,7-320086,A by the same applicant as this application by taking correspondence between each part articles (an eye, a nose, opening, etc.) of the face of an input image and a target image. In this case, as the above-mentioned example explained, after the face image of a target is changed into suitable size by the automatic scaling based on image pick-up conditions, processing of morphing, substitute, etc. is performed.

[0134] the sketch model data (being the so-called --) of the face currently beforehand prepared in the portrait-ized mode after detecting a face field Carry out an automatic scaling, as the template model was explained previously, and correspondence is taken between the edge intensity distribution of the face field of an input image, and the components of the face of a sketch model. Furthermore, the movement magnitude from the model data of the arrangement between components (each center-of-gravity location etc.) and the deformation of each part article are amplified to linearity or non-linearity, and the fixtures of a face are exaggerated. Thereby, the line drawing image of the portrait-ized face is generated.

[0135] In the above transform processing, in order to detect the location of conversion object domains (face field etc.) The model border-line data (face etc.) for conversion is inputted from storage the same with having explained with reference to drawing 13 or subsequent ones. What is necessary is to scan in an image what changed this into suitable size using image pick-up conditions by the formula (2) etc., and just to ask for the location where a correlation value with the border line for which it asked from the edge intensity distribution of an input image serves as max (or maximum).

[0136] An example of the processing flow which generalized pretreatment of these transform processing is shown in drawing 21 . A template model is changed into suitable size based on image pick-up conditions (a scale factor, photographic subject distance, the direction of a look, etc.) (S101), and point of inflection, a corner, the curvature maximum point, etc. on the border-line data are extracted as the focus of a template model, or focus data is read from storage as incidental information on template model data (S102). The edge intensity distribution of an input image are extracted (S103), binary-izing, a border-line extract, etc. are performed (S104), and the focus extracted with the template model and the same focus are searched for and extracted (S105).

[0137] Between the focus is matched (S106). Thereby, between the components which constitute faces, such as an eye, a nose, and opening, can be matched. That is, since the center-of-gravity location and size on the image of a template model are beforehand set up appropriately based on image pick-up conditions

etc., they can search for and detect the focus which corresponds in the near range for every focus in an input image for every focus on each part articles (an eye, a nose, opening, etc.) in a template model.

[0138] The location gap vector between corresponding points is extracted, and it normalizes on the basis of a center-of-gravity location (S107). Various image transformation is performed based on this result (S108).

[0139] A face field makes it become thin (making it grow fat), and deformation processing of conversion object domains (face image field etc.) is explained to an example for processing. A face makes it become thin and processing is variable power conversion (affine transformation) to which longitudinal magnification sets lateral magnification to a (it is 0< a<1 here) to 1 about the field inside a border line. It is made to grow fat and is set to a> 1 in processing.

[0140] After the location (reference point locations, such as a center of gravity) of a face field is detected, it asks by the method of showing the border line in drawing 16 . A face dwindles drawing 22 and it shows an example before and behind conversion of processing. It is made to become thin and a crevice occurs between parts for the face worn thin and a background in conversion photography. The image data of this gap portion is the following, and is made and generated. That is, the color component value or texture pattern of image data for a background which adjoins each border line of the face field in the original image is extracted, and the color component value of the adjoining portion is given to the pixel of an applicable portion, or the texture pattern of an adjoining field is mapped. The image of the whole background is photoed beforehand and the corresponding background image may replace a gap portion.

[0141] it is made to grow fat and a conversion object domain is **** in the background region of the original image data at processing at reverse -- what is necessary is just to interpolate the image data inside the border line of the field after conversion by the affine transformation image data of the original portion for conversion, although it becomes ******

[0142] When replacing by other face images as other transform processing While other target images changed into the template size set up as the image field for conversion was mentioned above replace A face dwindles fields, such as a gap portion (refer to drawing 22 (2)) produced when a configuration is not in agreement, and background-image data is inserted in them by extrapolation of texture mapping or a color component etc. like the case of processing.

[0143] In performing portrait-ization, while being able to give and predetermined-maximum-amplify the rate of exaggeration showing the degree of exaggeration of the location gap vector between the extracted each part articles, it divides (inch-between), and transforms the border-line data of the original template model by linearity extrapolation, such as law. For example, based on the template model which consists of a partial feature element indicated by JP,7-320086,A by the same applicant as this application, it asks for the new location of each focus of each partial feature element by linearity extrapolation, and the curve which ties smoothly the new partial feature element obtained as a result is generated. Thereby, the portrait-ized face image is called for.

[0144] It can save with the border-line data of the object domain after also changing the original image data of the field used as the candidate for conversion on the occasion of coding and record of the image after conversion. Thereby, when required later, processors, such as a computer, can be used and the original image data can be restored easily. The partial image of the object domain before changing into a file separate from the image data file after conversion as the record gestalt may be recorded, or you may record on a part for the header unit of the image data file after conversion. In generating the partial

image data file before conversion, it records the image data file name after changing into the header unit etc.

[0145] The background image is photoed beforehand, the target field is extracted based on the difference of the background image and the input image containing the candidate for conversion, and it may be made to perform image transformation which a user specifies as the field. Here, image pick-up equipment shall be used by the stock photography which is not fixed to a tripod etc., and makes it a prerequisite for a focus to differ from exposure conditions etc. in the time of background-image photography and the input image photography including a photographic subject. a pin -- and/or, processing becomes easier when exposure conditions are in agreement.

[0146] The extract of an object domain and the flow chart of a transform-processing process are shown in a photography actuation list at drawing 23 .

[0147] A background image is photoed (S111), the image pick-up conditions at this time are extracted (S125), and it memorizes to storage 220 etc. Conversion photography mode is set up (S112) and conversion targets (a hairstyle, a mustache type, facial form, etc.) and the degree of conversion are specified if needed (S113). A photographic subject image (input image in a previous example) is photoed (S114), the image pick-up conditions at this time are also extracted (S126), and it memorizes to storage 220.

[0148] Then, in order to extract the corresponding points between a background image and an input image (S115) and to remove the effect of stock photography therefore the rotation to produce, a parallel displacement, scale-factor fluctuation, etc., the geometric conversion parameter (affine transformation or transparent transformation parameter) of the background image in consideration of the difference among the image pick-up conditions between corresponding-points extract data and an image is presumed and extracted (S116). By taking into consideration the difference among image pick-up conditions, the incorrect correspondence in corresponding-points extract processing is removed, and geometric conversion in a high precision is enabled (S117).

[0149] It asks for a gray-scale-conversion parameter in consideration of a difference of image pick-up conditions, such as a pixel value between corresponding points and exposure conditions, and the gradation of a background image is changed (S118). Specifically with reference to the pixel values between corresponding points (RGB each color component value etc.), the pixel value translation table from a background image to the corresponding points of an input image to each gradation in 0 to 255 level is presumed. In consideration of photography conditions (exposure conditions etc.), much more high-degree-of-accuracy-ization can be attained by eliminating the pixel value data of incongruent corresponding points in the amount of fluctuation of image pick-up conditions clearly in that case.

[0150] Thus, the difference of the background image and input image which were changed is taken, and a photographic subject field is extracted by processing of making it binary with a predetermined threshold (S119). Since future processings are the same as the case of drawing 18 , detailed explanation is omitted.

[0151]

[Effect of the Invention] As explained above, according to this invention, in a set photograph, a commemorative photo, or a catalog photograph, the natural synthetic image into which the person or body which does not exist on that occasion was put is set by the composition and the photography conditions of a site, and simple actuation generates it, and it can be recorded in a photography site.

[0152] By using the auxiliary border line about a configuration, size, etc. of a photographic subject which

were recorded beforehand, if it is the same background, photographic subject extract and synthetic image generation can be automatically performed only by using the image in an auxiliary border line.

[0153] When removal of an unnecessary person or an unnecessary body is not depended on the complexity of the configuration, either but photos the image of only a background, it can remove easily and fitting for the background equivalent to the portion after removal can be performed by simple actuation.

[0154] According to this invention, moreover, the main photographic subject image portion which has the configuration of arbitration in an image input means by using image pick-up conditions at the time of an image pick-up (at the time of an image input) or the background-image portion except the main photographic subject Specify with a sufficient precision, without being influenced by an image pattern, lighting conditions, etc. of a background, the automatic (semi-automatic) conversion photography which performs conversion or processing processing of arbitration to an applicable portion is attained, and the image which performed such conversion can be recorded or transmitted.

[0155] Moreover, since a model border line can be set as the suitable location in an image with reference to photography conditions, a high speed and the field of a portion which is automatic and serves as a candidate for conversion can be extracted from an image, and desired conversion photography can be performed.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to a storage at the image processing system and method list which have photographic subject logging and an image composition function.

[0002]

[Description of the Prior Art] With image pick-up equipment, as the flexibility of processing processing of image information improves with digitization of signal processing conventionally inside equipment From comparatively simple processing of conversion of an intensity level or a color tone, color balance adjustment, quantization size conversion, etc. Things which added the image-processing function, such as an edge extract function and a thing which has the photographic subject extract function (pp.13 - 1994 [a television society technical report, Vol.18, / 18 or]) of a color component using the grown method serially, are proposed variously.

[0003] moreover, those difference after controlling light exposure in the method of extracting an image based on difference with a background image so that average luminance becomes proper at the time of the image pick-up of a background image and picturizing a subject-copy image using the same set point as a background image -- the configuration which extracts an object image based on data is known (for example, refer to JP,6-253197,A).

[0004] The technology shown below is known as the picture transmission which performs processing which is different from an input image to a specific region and other fields, or imaging technique. For example, it has the extract means of a specific object domain, and the technology of changing the coding property or transmission characteristic (the existence of transmission of a specific region being included.) etc. is indicated by JP,5-145914,A, JP,5-336374,A, JP,6-319130,A, JP,7-222048,A, JP,7-230554,A, and JP,7-250312,A by the image data of the portion which serves as image data of the field for [, such as a person,] specification, and a background from an input image.

[0005] Moreover, two or more fields are started from an image, the image transmission equipment equipped with a means to compound them by arrangement of arbitration is indicated by JP,7-298238,A, and the equipment which has a photographic subject extract means, the signal-processing parameter-control means about a photographic subject and a background or a processing circuit, and a substitute circuit is indicated by JP,5-110936,A, JP,6-169425,A, JP,6-225328,A, and JP,8-154259,A.

[0006]

[Problem(s) to be Solved by the Invention] Since the conventional image processing system which has a photographic subject extract function aimed at carrying out the separation extract of the photographic subject under specific photography conditions, when it performed edit processing processing of images with the background prepared separately besides the trouble that it is difficult to extract a photographic subject for a general background, such as image composition, it had the following problems. That is, at the time of photography, it cannot judge whether the style of the photographic subject which carried out the separation extract suits the composition of a background image etc., and unless it is at the synthetic time, it is not known. Moreover, if whenever [photography condition for example, lighting conditions exposure condition scale-factor, and focus] etc. differ, by the way, it will be necessary to become very unnatural and a synthetic image with sense of incongruity, and to add processing of conversion of a color tone, or gradation amendment between the background image which the user prepared separately, and the extracted photographic subject image.

[0007] This invention aims at showing the image processing system and method list which canceled such un-arranging a storage.

[0008] The conventional example of a publication does not tend to process some of those with a thing aiming at gathering coding effectiveness in an image pick-up system or a picture transmission system, and images into JP,5-145914,A etc.

[0009] The conventional example indicated by JP,7-298238,A extracts and compounds the rectangle field in an image, and cannot perform processing which specialized in the photographic subject portion of an arbitration configuration etc.

[0010] The conventional example indicated by JP,5-110936,A and JP,6-225328,A sets up the range of brightness, a hue, or the color difference as an extraction condition, since it considers that the portion which fulfills this condition is a photographic subject, in the combination of the background color of arbitration, and a photographic subject, a desired photographic subject field cannot be extracted and processing processing of it cannot be carried out.

[0011] Although a photographic subject is extracted in the video camera indicated by JP,6-169425,A based on the color or the intensity level of a video signal of a photographic subject portion to which it superimposes on the image of a photographic subject, a marker is displayed on the predetermined location in the display screen of a viewfinder, and a marker is located in it, a user needs to adjust and photo a field angle so that a marker and a desired photographic subject may lap, and he is very troublesome, and operability is bad, therefore extract precision of a photographic subject is bad.

[0012] By measuring a person's flesh color, JP,8-154259,A presumes a person's existence region, extracts the person image, and lacks in versatility.

[0013] Thus, it was difficult to perform semi-automatically image processing of adding a predetermined shading off or deformation to the main photographic subject or the background of having an arbitration configuration in an image, or the color scheme of arbitration, in the conventional example by automatic or simple actuation.

[0014] This invention aims at showing the image processing system and method list which cancel such un-arranging a storage.

[0015] This invention aims at showing the image processing system and method list which make it possible to perform automatically or semi-automatically image processing of adding a predetermined shading off or deformation to the main photographic subject or the background of having an arbitration

configuration in an image, or the color scheme of arbitration again a storage.

[0016]

[Means for Solving the Problem] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, A directions selection means for making directions selection of the particular part of an image input means including a storage means and a control signal generating means, and an inputted image, It has an image display means in an image-processing means, an image coding means, an image recording means, and an image recording data-medium list. A specific photographic subject extract means to extract a specific photographic subject in an image using image information of a portion by which directions selection was made with a directions selection means in an image into which an image-processing means was inputted, It is characterized by having a background image memorized by a storage means or image recording data medium and a synthetic image generation means to compound this extracted specific photographic subject.

[0017] This inputs a photographic subject image including a background of arbitration (photography), and actuation with simple generating a synthetic image of a background image and a photographic subject which are different from a background in a photographic subject image after extracting a photographic subject in it can realize. Moreover, by displaying a compounded image on an image display means, a location and magnitude of a photographic subject in a synthetic image can be checked, and after a directions selection means adjusted them further and taking a background and suitable matching, a synthetic image can be recorded, saved or outputted.

[0018] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, A directions selection means for making directions selection of the particular part of an image input means including a storage means and a control signal generating means, and an inputted image, It has an image display means in an image-processing means, an image coding means, an image recording means, a communications control means, and an image recording data-medium list. A specific photographic subject extract means to extract a specific photographic subject in an image using image information of a portion by which directions selection was made with a directions selection means in an image into which an image-processing means was inputted, It is characterized by having an input means of a background image through a communications control means, and a background image and a synthetic image generation means to compound an extracted specific photographic subject.

[0019] Thereby, in addition to the above-mentioned feature, a background image is inputted from the outside, and actuation with simple composition with a photographic subject in a **** image and a photographic subject image including a background of arbitration can realize.

[0020] In this invention, a control signal generating means inputs an auxiliary data about a configuration and a location of a specific photographic subject from a storage means, and it is characterized by displaying an auxiliary data on an image display means. By this, when a configuration or a style, a location, etc. of a photographic subject have become settled in general beforehand, by inputting the data (for example, border line of a rectangle frame or a photographic subject model same type etc.), and displaying on an input image in piles When a posture of a photographic subject in a photographic subject image etc. can be adjusted so that the auxiliary data may be suited in a site of image inputs, such as photography, activation of a body-ed extract is attained without performing partial assignment of an

image for a photographic subject extract by directions selection means.

[0021] In this invention, a control signal generating means inputs an auxiliary data about a configuration and a location of a specific photographic subject from a communications control means, and it is characterized by displaying an auxiliary data on an image display means. Thereby, in addition to said feature, an auxiliary data can be inputted from the outside of an image pick-up image-processing means.

[0022] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, An image input means, an image-processing means including a storage means and a control signal generating means, It has an image display means in an image coding means to have an image format conversion means, an image recording means, and an image recording data-medium list. An image format conversion means within an image coding means An image memorized by a storage means or image recording data medium is changed into a predetermined format. An image coding means changes a format of predetermined image data recorded on a storage means or image recording data medium. An image-processing means It is characterized by performing specific photographic subject extract processing in an inputted image, and carrying out image composition of an extracted specific photographic subject image and the image by which format conversion was carried out with an image format conversion means.

[0023] In an image-processing means equipped with a photographic subject extract which has by this the feature mentioned above, and an image composition processing facility, since a transform-processing means to a format suitable for image composition processing for the interior was built in, the selection range of a format of image data inputted can be extended sharply.

[0024] An image processing system concerning this invention Image formation optical system, a photo-electric-conversion means, a video signal processing means, An image input means, an image-processing means including a storage means and a control signal generating means, It has an image display means in an image coding means, an image recording means, and an image recording data-medium list. A control signal generating means has a photography condition measurement control means, and an image coding means encodes image data. Photography conditions are recorded on a record medium or a storage means in a predetermined format with encoded image data. It is characterized by an image-processing means compounding an image (background) which performed specific photographic subject extract processing in an inputted image, and was recorded on an extracted specific photographic subject, a storage means, or image recording data medium based on photography conditions.

[0025] Thereby, after performing gray scale conversion etc. based on photography conditions, a natural synthetic image which lost an extracted difference among photography conditions of an image and a background image of a photographic subject is obtained automatically.

[0026] In this invention, an auxiliary data is characterized by being a border line or mask data of predetermined size about a specific photographic subject. When a photographic subject configuration has become settled in general by this, a photographic subject extract can be automatically performed by obtaining a posture or a style of a photographic subject etc. which suited an auxiliary data in a site of an image input (photography), and extracting a field inside an auxiliary border line by displaying the border line or its contrant region on an input image in piles (special display of coloring etc.). Furthermore, when a background of a background image and a photographic subject image is mostly in agreement, precision of a photographic subject extract improves sharply.

[0027] In this invention, an auxiliary data is characterized by being the close border line of a

predetermined configuration. Even if it does not approximate a configuration of a photographic subject, as mentioned above, when a background of a background image and a photographic subject image is mostly in agreement, precision of a photographic subject extract improves sharply by specifying a photographic subject field with a very rough configuration given by close border lines, such as a rectangle reflecting the size in every direction, or an ellipse.

[0028] In this invention, photography conditions are characterized by including a class and the direction of a look of light exposure or shutter speed, the amount of focuses, a photography scale factor, and illumination light. It is because a difference among these photography conditions is absorbed between a photographic subject image and a background image and a natural synthetic image is obtained. In addition, the direction of a look is used for assignment of a field that a photographic subject only exists etc.

[0029] In this invention, an image-processing means performs synthetic processing of an image, after one image performs predetermined transform processing to some [at least] fields of an image based on a difference between photography conditions at the time of photography of an inputted image, and photography conditions of a background image so that while may carry out abbreviation coincidence with photography conditions of an image of another side. A natural image can be obtained, when one gradation, color tone, contrast, or sharpness of an image etc. is changed based on photography conditions and it compounds with an image of another side by this.

[0030] In this invention, a control signal generating means inputs an auxiliary data about a configuration and a location of a specific photographic subject from a storage means, and is characterized by changing a configuration or a location of an auxiliary data based on photography conditions. Since the features (a configuration of a border line, contrast, etc.) of an auxiliary data can be automatically changed proper according to photography conditions of an input image even when [from which photography conditions (a scale factor, lighting conditions exposure conditions etc.) when inputting a background image (photography) and photography conditions at the time of an input of a photographic subject image differ by this] case or changing, it can simplify and subsequent photographic subject extract processing can be performed.

[0031] A step into which an image-processing method concerning this invention inputs an image from a predetermined image input means, Measurement or a setting step of an image input condition of an inputted image, a step which records an image input condition on a predetermined storage means, A photographic subject extract step which extracts a specific photographic subject from an inputted image, an image composition step which compounds an image of a photographic subject extracted based on an image input condition, and a background image recorded on a predetermined storage means, It is characterized by consisting of an image output-control means step which performs an output to record or a predetermined display means by predetermined format for a predetermined storage means of a synthetic image obtained at an image composition step.

[0032] Thereby, it is not concerned with a difference or fluctuation of an image input condition, but image composition with a specific photographic subject in a predetermined input image and a background image is made to a natural thing. Moreover, as long as the procedure is followed, image composition stabilized without being based on configuration is attained.

[0033] This invention is characterized by to provide an image transformation means or a step which performs predetermined conversion to an image of a background region except an object domain or an object domain an image input means or a step, an image pick-up condition extract means or a step, an

image transformation mode setting means or a step, a field extract means or a step that asks for a predetermined object domain using image pick-up conditions from an input image, and among input images. Thereby, a partial configuration of a photographic subject can certainly be specified from image pick-up conditions etc., and image pick-up equipment or a picture input device which can add and picturize desired conversion can be realized.

[0034] This invention An image input means, an image display means, and an image pick-up condition extract means, An image transformation mode setting means and a field setting means to set up a predetermined object domain based on the image transformation mode concerned or the image pick-up conditions concerned from an input image, It is characterized by providing a boundary layer display means to superimpose a boundary line of a setting field on an input image, and to display on an image display means, and an image transformation means to perform predetermined conversion to an image of a background region excluding an object domain or an object domain among input images. This invention is characterized by to provide an image input step, an image pick-up condition extract step, an image-transformation mode-setting step, the field setting step that sets up a predetermined object domain based on the image-transformation mode concerned or the image pick-up conditions concerned from an input image, the boundary layer display step which superimposes a boundary line of a setting field on an input image, and display on an image-display means, and the image-transformation step which perform predetermined conversion to the image of the background region excluding an object domain or an object domain among input images. Photography from which a photographic subject is changed in a field which corresponds after checking by looking a field where a conversion field according to a photographic subject could be set up automatically, and a user was set up by this, or an image input which can check an image after conversion is realized.

[0035] Moreover, this invention is characterized by to provide the image-transformation means or the step which performs predetermined conversion to the image of the background region excluding an object domain or an object domain among a field extract means or a step which asks for a predetermined object domain, and input images based on an image input means or a step, an image pick-up condition extract means or a step, an image-transformation mode-setting means or a step, and the image pick-up conditions concerned or the image-transformation mode concerned. [image / input] An image input can be carried out, after being able to extract a field of a photographic subject from an image automatically based on image pick-up conditions etc. and changing a request to the extract field by this.

[0036] In this invention, an image transformation means or a step is characterized by performing predetermined texture-mapping processing to an object domain based on image pick-up conditions or image transformation mode. Moreover, an image transformation means inputs other images from a predetermined storage means, and is characterized by changing an object domain by other images based on image pick-up conditions or image transformation mode. By these, an image input means by which a specific region according to image pick-up conditions or image transformation mode is convertible is offered.

[0037] Moreover, an image transformation means or a step is characterized by changing a specific color component of an object domain into other color components. An image input means by which a color component of an object domain pinpointed using image pick-up conditions etc. is automatically convertible by this is realizable.

[0038] In this invention, an image transformation means or a step is characterized by performing

predetermined geometric deformation to an object domain. An image input means by which geometric deformation of affine transformation etc. can be added to an object domain pinpointed using image pick-up conditions etc. by this is realizable.

[0039] In this invention, it is characterized by an image transformation means or a step adding predetermined watermark information to image data after conversion. Thereby, information, such as a field for a transducer and a translation mode, is recordable in not being visually perceived with an image. Furthermore, after treatment of restoring an image before conversion based on such information can perform simply.

[0040] difference of a background image and an input image into which a field extract means or a step was beforehand inputted in this invention -- it is characterized by asking for an object domain based on data. Thereby, a field for conversion can be pinpointed automatically.

[0041] In this invention, a field extract means is characterized by providing a field extract means to extract a field where similarity serves as a storage means of a predetermined template model image, and a similarity detection means of a template model and an input image with below a predetermined threshold or the maximum. A field extract step is characterized by providing a similarity detection step which detects similarity of a template model and an input image which are memorized by storage means, and a field extract step which extracts a field where similarity serves as below a predetermined threshold or the maximum. Thereby, while changing template size appropriately using image pick-up conditions etc., a picture input device which can pinpoint a field for conversion automatically as a high field of a template configuration and similarity is realizable.

[0042] In this invention, an image transformation means or a step is characterized by performing conversion of an intensity level or a color component value based on image pick-up conditions about a part of object domain or background region. A picture input device which can specify and carry out image transformation of the portion which should be changed beforehand by this in a field pinpointed as a candidate for conversion is realizable.

[0043] In this invention, a field extract means or a step is characterized by what a boundary line of an extract field is superimposed on an input image, and is displayed on said image display means. Thereby, a user can perform image transformation photography, after checking the range of an extracted field.

[0044] In this invention, a field setting means or a step is characterized by having a location or a size-change means of a field. Conversion photography which can adjust set-up a location or size of a conversion field simply by this can be performed.

[0045] In this invention, a field extract means or a step sets up a location and size in an input image of a template model image based on image pick-up conditions, and it is characterized by asking for a border line of an object domain by making a border line of a set-up template model image into an initial outline. Even if it is the photographic subject which has a border line which is somewhat different from a configuration specified with a template model by this, conversion photography which can perform image transformation automatically about a field inside a right border line is attained.

[0046] In this invention, it is characterized by displaying the border line, when a display action of a border line is chosen by border-line display means or display selection means predetermined in a step. Thereby, conversion (or the reverse) in conversion photography mode from photography mode, a check for conversion, etc. can usually be performed.

[0047]

[Example] Hereafter, the example of this invention is explained to details with reference to a drawing.

[0048] Drawing 1 shows outline configuration block drawing of the 1st example of this invention. The image formation optical system 12 in which the image pick-up image processing system 10 includes a taking lens and the drive controlling mechanism for zoom photography, an image sensor 14 like CCD series, the measurement control circuit 16 which measures and controls an image pick-up parameter, the video signal processing circuit 18, storage 20, control of image pick-up actuation, Control of image pick-up conditions, The control signal of an image processing and an image output The control signal generating circuit 22, EVF to generate (Electronic view finder) etc. -- in the directions selecting arrangement 26 which consists of the display display 24, a pen mold key, or a cross-joint key etc. which makes a finder serve a double purpose, stroboscope luminescence equipment 28, a record medium 30, the image coding network 32, the image output circuit 34, the photographic subject extract circuit 36, and a list The image composition circuit 38 is provided.

[0049] An image pick-up parameter measurement control circuit 18 possesses the control signal generating circuit which generates the control signal of video signal properties, such as a gamma property, a knee property, and color balance, in the light-exposure control circuit which controls the scale-factor detector which detects the scale factor of the zoom lens which can change a photography scale factor freely, the focus condition detector which detects the focus condition on the image pick-up side of an image sensor 14, the charge storage time of an image sensor 14, and/or the diameter of a opening of drawing of the image-formation optical system 12, a stroboscope luminescence control circuit, and a list. These parts are realized by software. An image pick-up parameter includes the direction of a look, the existence of stroboscope luminescence, the classes (for example, daylight, a fluorescent lamp, an incandescent lamp, stroboscope light, etc.) of illumination light, etc. other than whenever [photography scale-factor and focus], and light exposure. The direction of a look is detected by the look detection equipment (not shown) built in the video signal processing circuit 18.

[0050] The video signal processing circuit 18 has amendment circuits, such as gamma, a knee, and a white balance, an automatic focus (AF) circuit, an automatic-exposure-control (AE) circuit, an automatic-gain-control (AGC) circuit, etc.

[0051] The directions selecting arrangement 26 consists of a pen mold key, a cross-joint key, etc. However, the touch panel is united with the display display 24, and when the panel for actuation is displayed on the screen of the display display 24, the displayed panel for actuation becomes one gestalt of the directions selecting arrangement 26.

[0052] A record medium 30 consists of various data medium, such as disk media, such as a magnetic tape, an optical disk, or a magneto-optic disk, a flash memory, and an IC memory. In this example, a record medium 30 is not limited to special data medium. A record medium 30 can be freely detached and attached to the image pick-up image processing system 10.

[0053] The image coding network 32 carries out compression coding of the image data in a predetermined format with incidental data, such as photography conditions.

[0054] With reference to drawing 2 , the extract of the photographic subject which is characteristic actuation of this example, and a synthetic process with a background image are explained.

[0055] A user photos an image including the photographic subject which should be extracted (S1), and extracts the field image in which a photographic subject exists by the photographic subject extract circuit 36 using the directions selecting arrangement 26 etc. (S2, S3). For example, several [on the border line of

the photographic subject of the input image displayed on the display display 24] are directed with the directions selecting arrangement 26, and the reference point of a photographic subject extract is set as the photographic subject extract circuit 36. The photographic subject extract circuit 36 performs an edge trace to which between adjacent data is connected by the predetermined method, and obtains the border line of the photographic subject as one closed curve. Edge data can be obtained space differential filtering processing of SOBEL, Laplacian, etc. by the well-known method to an input image. Thus, the image of the field inside the closed curve obtained is extracted as a photographic subject image (S3). The extract method of the closed curve equivalent to the outline of a photographic subject is not limited to the method mentioned above.

[0056] Compression coding is carried out by the predetermined compression method (for example, compression coding method using a wavelet transformation, DCT conversion, etc.), and the image data of the extracted photographic subject field is stored in storage 20 in a predetermined format with photography conditions, such as a photography scale factor and exposure conditions (charge storage time of an image sensor, existence of stroboscope luminescence, etc.), (S4).

[0057] Next, a background image is photoed or inputted (S5). The photographic subject image extracted previously is read from storage 20 or a record medium 30, displaying a background image (S6). The gradation and the color tone of a photographic subject image are adjusted (S7), and mixing with a background image and smoothing of a photographic subject near an outline are performed, and it compounds so that a photographic subject image may be overwritten at a background image, and displays on the screen of the display display 24 so that differences, such as gradation by the difference among the photography conditions between a background image and a photographic subject image and a color tone, may be controlled (S8). In order to gather the display speed of the display display 24, it may be made to perform amendment processing depending on photography conditions at the time of record of a synthetic image.

[0058] Drawing 3 shows the example of the display screen of the display display 24. The photographic subject image display fields 40a, 40b, and 40c which display three photographic subject images obtained as a result of extract processing on the display display 24, The synthetic image display field 42, the expansion carbon button 44 which directs an enlarged display, the contraction carbon button 46 which directs a reduced display, the navigation key 48 which directs migration on four directions, return key which directs return to pretreatment 50a, and delivery key 50b which directs the next processing or subsequent ones are displayed.

[0059] According to directions of a user, the location and size of a photographic subject image are adjusted (S9). At this time, the auxiliary frame 52 which expresses the size and the location of a photographic subject roughly is displayed to surround the photographic subject image on a synthetic image. Highlighting of the selected photographic subject image (image displayed on photographic subject image display field 40a in drawing 3) is carried out by **** etc. so that it may turn out to be it. Such an expression method is common knowledge. Drawing 4 shows the synthetic example which detached and added a little still more nearly same photographic subject image. Since a photographic subject image becomes large as a result, the auxiliary frame 52 in which the location and size of a photographic subject image are shown is larger than the case of drawing 3 .

[0060] A user operates the expansion carbon button 44, the contraction carbon button 46, and the navigation key 48 for repositioning with a touch pen, a mouse, or a finger, and can change the size and the

location of a photographic subject image. The graphical user interface using such carbon buttons itself is common knowledge. Although it is needless to say, such a manual operation button etc. may be set as the predetermined location on the surface of the main frame. It can return to a front processing phase by return carbon button 50a, and can shift to the next processing phase by stepper-button 50b.

[0061] A user judges that it is in the suitable arrangement and the size in a background image the size of the extracted photographic subject image, and as a result of adjustment of a location, if a user pushes the synthetic record carbon button on a control panel, compression coding will be carried out and synthetic image data (of course, the auxiliary frame 52 is removed.) will be recorded on storage 20 or a record medium 30 (S10). In the case of this record, the photography conditions used for the synthetic image generate time may be encoded as incidental information, and you may record on the header unit of an image data file etc. As incidental information, parameters, such as the center-of-gravity location of the rectangle frame (for example, auxiliary frame 52 of drawing 3) circumscribed to the coordinate of each point on the border line of the photographic subject portion at the time of synthetic record and its border line other than photography conditions and size in every direction or a center-of-gravity location of the ellipse circumscribed to the border line, size of the main shaft, a direction, and an ovality, may be included.

[0062] Apart from a synthetic image, the incidental information about such a configuration of a photographic subject, a location, and size can be read by next photography, and can also be displayed on the display display 24 in piles as an auxiliary data at an image. By doing in this way, the time and effort which a photographic subject extract takes in a series of processings from the extract of a photographic subject to perform to composition with a background about a photographic subject of the same kind can be saved.

[0063] After drawing 5 indicates the border line of an extract photographic subject image by superposition previously at a background image and adjusts the location and size of a photographic subject image, it shows the modification flow chart which compounded the photographic subject image. S11-S15 are the same as S1-S5 of drawing 2 . The border line of an extract photographic subject image is indicated by superposition at a background image (S16), and the location and size of a photographic subject image are adjusted (S17). Then, extract photographic subject image data and incidental information data are inputted, a photographic subject image is compounded to a background image, as it enters into a border line (S18), a photographic subject image is amended according to photography conditions etc. (S19), and a synthetic image is recorded on a record medium 30 (S20).

[0064] In addition, when the background in a background image and the photographic subject image before extract processing is performed is almost the same, even if the image field which should be extracted contains a part for a background to some extent, if it removes a changed part produced according to factors, such as a difference among photography conditions, it hardly poses a problem at the time of composition. Therefore, it cannot be overemphasized that in such a case a photographic subject may be roughly extracted and used including a background with a rectangle frame, an ellipse, etc. as mentioned above.

[0065] Therefore, automatic extracting of the field which corresponds in the rectangle frame 54 of an applicable part when the image which removes an unnecessary person or an unnecessary body by photographic subject extract processing, and is obtained at the time of photography, i.e., the image with which a certain field was missing as shown in drawing 6 , is used as the 1st image, next a **** image is photoed may be carried out, and the 1st image may be compounded so that the image field for a

background after removal may be filled up. Photographic subject image 40c of drawing 6 extracts the image in the rectangle frame 54, and is obtained. Also in this case, a synthetic result is displayed on a display means, and with directions of a user, a synthetic result image is encoded and it records on a predetermined record medium.

[0066] Next, the 2nd example of this invention is explained. In the 2nd example, the image (the 1st image: don't ask an animation or a still picture.) prepared beforehand is captured through a record medium or means of communications of a main part etc. which can be detached and attached, and it compounds with the image (the 2nd image: don't ask an animation and a still picture.) photoed on the spot, and the synthetic image obtained as a result is recorded on the record medium or storage of a main part, or is outputted outside. Drawing 7 shows outline configuration block drawing of the example. The same sign is given to the same component as drawing 1 . As for the record medium which 140 can detach and attach freely, and 142, a communications control circuit and 144 are image data format conversion circuits. In case the image data format conversion circuit 144 changes into a predetermined content-type the image data of various formats inputted through communications control circuit 142 grade and outputs image data outside through the communications control circuit 142, it is changed into external predetermined format from a content-type.

[0067] In this example, when the 1st image is a photographic subject image with which logging was already performed, the 1st image is compounded with the 2nd image (background image), without performing photographic subject extract processing mentioned above after the input of the 1st image. In addition, photographic subject extract processing may be performed to the 2nd image, and you may compound with the 1st image.

[0068] As the gestalt of the image inputted from the outside through the communications control circuit 142, and a class of image For example, a document image, a photograph, etc. of file format which were transmitted from the external terminal which goes via TV or a video image, the telephone line, etc., It is various, and although this example is not limited to either, data format presupposes that it is the image data transmitted to the list with other wireless or cables from image input devices (a digital camera, a scanner, FAX, etc.) a well-known thing. Similarly, what is necessary is just the thing of the format common knowledge of the classification of the image data recorded on a record medium 140.

[0069] In this example, the data format which can be inputted is defined beforehand and a user chooses from them. the video signal with which coded-image data was treated as input data format, the classification was specifically judged at the time of an input (an automatic judging or manual judging by the user), and it was encoded [DPCM] -- or the file format by which predetermined was encoded is identified. The image data by which run length coding was carried out [MR / (MODIFAIDO lead) / DPCM coding or] as a video signal, The thing of animation correspondences as a file format, such as MPEG and QuickTime (trademark of U.S. Apple Computer, Inc.), Bit map format, such as JPEG, TIFF, BMP/DIB, and GIF, PICT, PCX, It can incorporate with the data stream of the printer represented by three-dimension scene symbolic conventions for rendering applications, such as RIB, and PCL, and spreadsheet image formats, such as XLS, can be inputted into drawing data format, such as bit image format and other PPT, and a list.

[0070] The inputted image data is decrypted, and after an error correction is carried out, a format is changed into it by the fixed format (bit map format, such as TIFF, BMP/DIB, or JPEG, is typical.) which suits an internal image processing if needed.

[0071] The 1st image is a dynamic image, and when extracting a photographic subject from one of them and compounding with the 2nd image (background image), one frame which the user chose is changed into the data format of a static image.

[0072] The 1st image is a dynamic image by which the photographic subject extract was already carried out, and in the case of animation format, the 2nd image also prepares the keying signal generating said way and the synthetic circuit as a part of image-processing means inside a main part, generates a keying signal about the photographic subject field in the 1st image in it, and may compound a photographic subject image (foreground image) and a background image to it with an animation.

[0073] With reference to drawing 8 , the actuation and procedure of an example which are shown in drawing 7 are explained. First, a user chooses three kinds of one, a photography input, a communication link input, and a data-medium input, as image input mode of the 1st image (S21), stores in storage 20 the image inputted in the appointed image input mode (S22), and displays on the display disk play 24 (S23). While specifying a communication configuration or the source in a communication link input, inputting image data between 1 scheduled time or the number of fixed sheets by a predetermined protocol or a predetermined correspondence procedure and memorizing to storage 20, it displays on the display display 24. In a data-medium input, a list of the record image of a record medium 140 is displayed, the image of 1 or two or more requests is chosen as it from the inside, and it reads into storage 20. A display and selection of the image after taking a photograph also in a photography input are the same.

[0074] A user chooses one suitable image frame or a series of dynamic-image frames from the image displayed on a display 24 (S24), and stores in storage 20 as the 1st image (S25).

[0075] The photographic subject image which a user should use the directions selecting arrangement 26 when photographic subject extract processing is not yet made to the 1st image, and he should extract from the 1st image is specified, and the photographic subject extractor 36 extracts a photographic subject image by the same processing as a previous example (S26). The location and size of a photographic subject image to a background image are adjusted (S27). At this time, it specifies whether a background image is overwritten and a photographic subject image is displayed or in order not to lower the display speed to the display display 24, only the border line of a photographic subject image is displayed on a background image in piles. A means for that is the same as that of the example explained previously, and is good.

[0076] When the photography condition is attached to the photographic subject image and/or the background image as incidental information, like the 1st example, based on the difference among photography conditions, one gradation, color tone, etc. of an image are changed so that it may agree with the image of another side mostly (S28), a synthetic image is generated (S29), and it records on a record medium 140 (S30).

[0077] In addition, when the class and exposure conditions of the illumination light are not attached to image data as photography conditions, it enables it for a manual to adjust gradation and/or a color tone (S31-33). Even if photography conditions are attached to image data, this can be used also when it cannot be satisfied with automatic amendment of gradation and a color tone. If the slide bar 150 for lightness conversion (or carbon button) and the slide bar 152 for saturation conversion (or carbon button) are displayed on a display panel and a user specifically operates which slide bar (or carbon button) 150,152 so that it may be set as manual adjustment mode (S31) and may illustrate to drawing 9 , the color tone and contrast (or lightness and saturation) of a photographic subject image portion will be adjusted (S32). Of course, after specifying the particular part of a photographic subject, the color tone etc. can also be

adjusted. If a user checks a synthetic result and inputs record directions (S33), a synthetic image will be recorded on a record medium 130 (S30).

[0078] Thus, simple actuation can generate a natural synthetic image and it can record in the site of photography.

[0079] In each above-mentioned example, you may record on storage 20 or a record medium 30,140 at the photographic subject border line obtained as an extract processing result of a photographic subject, or its border line by using as auxiliary border-line data the rectangle frame data which carries out abbreviation circumscription. As shown in drawing 10 , when the auxiliary outline display carbon button 154 is formed in a display panel and the carbon button 154 is pushed, the control signal generating circuit 22 reads the auxiliary border-line data from storage 20 or a record medium 30,140, and makes an input image display in piles as an auxiliary border line 156 on the screen of the display display 24. The photographic subject image 158 surrounded by the auxiliary border line 156 does not need to be in agreement with photographic subject image 40c.

[0080] If the set-up photography conditions (especially a photography scale factor, the direction of a look, etc.) are changed, this will be interlocked with and the size location and configuration of the auxiliary border line 156 will be changed automatically. In this case, if the size A of a proper is beforehand-given to the photographic subject as incidental information, the size on the screen decided by photography conditions, such as a photography scale factor and photographic subject distance (it presumes from whenever [focus] etc.) of an outline, will be calculated, and the auxiliary border line 156 will be displayed on the display display 24 in the magnitude which suits that size.

[0081] For example, in a focal distance, if distance from the 2nd principal point location of A and image formation optical system to an image sensor side is set [the gap from the maximum of f and focus level] to v for dp and the standard size of a photographic subject, the photographic subject size S on a screen will be given by the bottom formula. namely, $\cdots S=A(v-f)(1+(v-f)\,dp/f)/f$ (1)

However, fluctuation of photographic subject distance and fluctuation of focus signal level consider as linearity. Therefore, what is necessary is just to change the size of an auxiliary data according to scale-factor S/A based on a formula (1), if dp is measured and it asks for f from a lens location.

[0082] Moreover, a user resets an auxiliary data as a suitable location using the directions selection means 26 if needed, and may correct the size etc.

[0083] The photographic subject extract technology used in the above-mentioned example is explained. Generally it indicates by setting in the suitable location on an input image by making an auxiliary border line (or mask data as field data inside an auxiliary border line) into an initial outline (or initial field), and the following photographic subject logging processings are performed by making it into an initial data.

[0084] Specifically, the method of using a dynamic outline as the base is used (331 D.Terzopou1 M.Kass, A.Witkin, os, "Snakes:Active Contour Mode1s", 1nternationa1 Journal of Computer Vision, pp.321- 1988). A dynamic outline method is a method of extracting an objective outline from edge information, and an initial border line is completed as the outline on a body by transforming a border-line model so that the energy performance index which meant as a constraint that an outline is smooth, that it was on an edge, etc. may serve as min. Moreover, it is based on a difference with the characteristic quantity of the image of the near field of for example, an initial outline, and the image about the local field of a photographic subject portion as concrete technique into which this was developed. The technique of making the inner sense or outward external force act on the point on the outline of a dynamic outline is known. (For

example) R. Ronfard and "Region-Based Strategies for Active Contour Models" and International Journalof Computer Vision and pp.229- 251 and 1994 -- and dynamic "outline extract based on description of field obtained from clustering" Institute of Electronics, Information and Communication Engineers paper magazine D-II besides Eito, vol.J75-D-II, and pp.1111- 1119, 1992, etc.

[0085] Although especially the technique of image logging is not limited, an initial outline configuration is the method that logging can be performed, automatically in the conditions which approximate a photographic subject configuration well, and the above-mentioned method has it at this point. [desirable]

[0086] Rough assignment (for example, a closed curve or a rectangle frame surrounding an object etc.) about the location and magnitude for logging may be performed, and you may record beforehand with an image as incidental data. After treatment performs image logging or image composition on other terminals after photography termination. Moreover, the image data inside a border line is extracted as it is, and it may compound with a background image and you may record.

[0087] Drawing 11 shows outline configuration block drawing of the 3rd example of this invention. The image formation optical system 212 in which the image pick-up image processing system 210 includes a taking lens and the drive controlling mechanism for zoom photography, an image sensor 214 like CCD series, the measurement control circuit 216 which measures and controls an image pick-up parameter, the video signal processing circuit 218, storage 220, control of image pick-up actuation, Control of image pick-up conditions, The control signal of an image processing and an image output The control circuit 222, EVF to generate (Electronic view finder) etc. -- a finder The display display 224 made to serve a double purpose, a pen mold key Or photography mode setting equipment 240 is provided in the directions selecting arrangement 226 which consists of a cross-joint key etc., stroboscope luminescence equipment 228, a record medium 230, the image coding network 232, the image output circuit 234, the photographic subject extract circuit 236, the image transformation circuit 238, and a list.

[0088] Equipment 210 is divided into main part 210a and image-processing section 210b, the photographic subject extract circuit 236, the image transformation circuit 238, and display display 224b are held in image-processing section 210b, and you may make it hold the remainder in main part 210a, as shown in drawing 12 .

[0089] The touch panel is united with the display display 224, and when the panel for actuation is displayed on the screen of the display display 224, the displayed panel for actuation becomes one gestalt of the directions selecting arrangement 226.

[0090] A video signal processing circuit 218 possesses the control signal generating circuit which generates the control signal of video signal properties, such as a gamma property, a knee property, and color balance, in the light-exposure control circuit which controls the scale-factor detector which detects the scale factor of the zoom lens which can change a photography scale factor freely, the focus condition detector which detects the focus condition on the image pick-up side of an image sensor 214, the charge storage time of an image sensor 214, and/or the diameter of a opening of drawing of the image-formation optical system 212, a stroboscope luminescence control circuit, and a list. These parts are realized by software. An image pick-up parameter includes the direction of a look, the existence of stroboscope luminescence, the classes (for example, daylight, a fluorescent lamp, an incandescent lamp, stroboscope light, etc.) of illumination light, etc. other than whenever [photography scale-factor and focus], and light exposure. The direction of a look is detected by the look detection equipment (not shown) built in the

image pick-up image processing system 210.

[0091] The video signal processing circuit 218 has amendment circuits, such as gamma, a knee, and a white balance, an automatic focus (AF) circuit, an automatic-exposure-control (AE) circuit, an automatic-gain-control (AGC) circuit, etc.

[0092] Storage 220 becomes ROM and the list which store the processing program used for a frame buffer, a Video RAM, the template data used for conversion photography, and image transformation from other primary storage means.

[0093] A record medium 230 consists of various data medium, such as disk media, such as a magnetic tape, an optical disk, or a magneto-optic disk, a flash memory, and an IC memory. In this example, a record medium 230 is not limited to special data medium. A record medium 230 can be freely detached and attached to the image pick-up image processing system 210.

[0094] The image coding network 232 carries out compression coding of the image data in a predetermined format with incidental data, such as photography conditions.

[0095] In this example, a request can be automatically processed in a photography image at the time of photography. This is called conversion photography mode on these specifications. conversion photography mode -- bloodshot-eyes amendment mode, mustached removal mode, and silverfish -- there is removal/addition mode of a freckle etc. About size, a location, etc. in the screen of a photographic subject, if it is selectable and there is no assignment from a user especially at this example about the 2 of automatic detection mode and manual setting mode modes to one, as for a user, automatic detection mode shall be set up.

[0096] In this example, it shall record and prepare for storage 220 or image recording data medium 230 beforehand at the model border line belonging to a photographic subject category, or its border line by using as auxiliary border-line data the border-line coordinate data of the frame of the predetermined configurations (a rectangle or ellipse) which carry out abbreviation circumscription. Moreover, what consists of a partial border line showing the category for an extract of a configuration as a model border line, for example, the model which consists of a partial feature element indicated by JP,7-320086,A by the same applicant as this application, may be used.

[0097] The auxiliary border-line (above-mentioned model border line) data which has the size set up by the method of mention later based on photography conditions, such as a scale factor and photographic subject distance, is scanned sequentially from the edge on a screen, whenever [with the edge intensity distribution of an input image / coincidence] (for example, correlation value) is evaluated in automatic detection mode in each location, and it asks for the maximum location of whenever [coincidence] as an optimal location. Thus, even if it is a case as two or more extract object domains are included, automatic activation of two or more detection and field extracts of the location of a photographic subject field can be carried out.

[0098] The contents of each translation mode are explained briefly. mustached removal (addition) mode and silverfish -- in freckle removal mode, a person's head or face is first detected from an input image.

[0099] It is good by the method of detecting the location where a standard template image (a shade image or color picture) is used for others, it is changed into suitable size as detection processing of a face or an eye based on photography conditions, a correlation value is calculated [location] in each location in an image, and correlation serves as max or the maximum.

[0100] in manual setting mode, a control circuit 222 is shown below -- as -- auxiliary border lines (border

line of the face displayed with a closed curve etc.) -- the screen top of a display 224 -- displaying -- the inside of the auxiliary border line -- outline ****** -- like, a user adjusts image pick-up conditions, such as a scale factor and a line of sight, or the location and size of an auxiliary border line are changed.

[0101] In the bloodshot-eyes amendment in automatic detection mode, the eye in an input image is detected and the pixel equivalent to bloodshot eyes is alternatively changed into black etc. The details of this processing are mentioned later. I display on the screen of a display 224 by making the model border line (both eyes or one eye) of an eye into an auxiliary border line, and have a user set up image pick-up conditions in manual setting mode.

[0102] In mustached removal mode, the beige component of a face is extracted after detection of a face field, and the field pixel of black or off-white is changed beige except for the hair in a face in the field to which a mustache may exist.

[0103] silverfish -- in freckle removal mode, the representation color component value of the beige component of a face is extracted after detection of a face field, and the pixel value of the field which has an especially different color component from a beige representation color component value in each field of a cheek, a jaw, and a frame in a face is changed into the color component value of a representation color.

[0104] Each above mode changes the particular part of a photographic subject, and it is necessary to pinpoint the range for conversion in a high precision. With reference to drawing 13 , the details of the extract process of a photographic subject field and the image transformation process of a photographic subject portion are explained.

[0105] A user sets up conversion photography mode with photography mode setting equipment 240 first (S41). An image including the photographic subject set as the object of conversion is photoed after conversion photography mode setting (S42), and automatic detection mode or manual setting mode is distinguished (S43).

[0106] In the case of manual setting mode (S43), the location where a photographic subject exists with the photographic subject extractor 236 using the directions selecting arrangement 226 etc. is specified (S44). For example, in using a pen type thing as a directions selecting arrangement 2269, it directs the point equivalent to the reference points (center of a face etc.) of the photographic subject of the input image displayed on the display display 224 with the pen. It is good also considering the location of the direction of a look which detects with a look detection means and is acquired as a reference point.

[0107] in the case of automatic detection mode (S43), it is shown in (drawing 14 -- as --) -- a control circuit 222 reads auxiliary border-line data from storage 220 or a record medium 230 (S45). Furthermore, the auxiliary border line 250 (drawing 14) may be displayed on an input image in piles centering on a reference point location on the screen of the display display 224. This display action may be made to be started by pushing the carbon button 248 (drawing 14) for an auxiliary outline display. As mentioned above, this auxiliary border line is a border line of the face expressed with a closed curve etc., and shows the outline configuration of the field which should be changed etc. That is, it differs from the marker who only shows the target location.

[0108] Corresponding to the set-up photography conditions (especially a scale factor, the direction of a look, etc.), according to the fluctuation, a control circuit 222 is set up automatically and changes the size, location, or configuration of auxiliary border-line data (S46). In this case, the size A of a proper shall be beforehand given to the photographic subject as incidental information, and a control circuit 222 calculates the auxiliary-data size on a screen from photography conditions, such as a scale factor and

photographic subject distance (from whenever [focus] etc. to presumption) of an outline, changes it into suitable size, and is displayed on the display display 224 as a close border line. For example, in a focal distance, if distance from the second principal point location of A and image formation optical system to the image pick-up side of an image sensor 214 is set [the gap from the maximum of f and focus level] to v for dp and the standard size of a photographic subject, the photographic subject size S on a screen will be given by the following formula. namely, -- $S=A(v-f)\{1+(v-f)\ dp/f\}/f$ (2)

However, suppose that fluctuation of photographic subject distance and fluctuation of focus signal level are linearity.

[0109] Therefore, what is necessary is just to change the size of an auxiliary data by measuring dp and asking for f by lens location measurement etc. according to scale-factor S/A based on a formula (2). It cannot be overemphasized that photographic subject distance may be presumed with other means (for example, ranging means using a laser beam etc.).

[0110] The photographic subject extractor 236 makes an auxiliary border line (or mask data as field data inside an auxiliary border line) an initial outline (initial field), sets it as the suitable location on an input image, and performs extract processing of a photographic subject field by making it into an initial data (S47). However, when manual setting mode is chosen, the set-up interior of an auxiliary border line is extracted as a photographic subject field. When for example, bloodshot-eyes amendment mode is set up as photography mode, the rectangle which includes the both eyes of the portrait image corresponding to the configuration border-line model or standard photography distance of both eyes as an auxiliary border line, and has size comparable as the gap of both eyes is used.

[0111] In this example, the method which made **-SU the dynamic outline method indicated by JP,9-185719,A by the same applicant as this application is used. A dynamic outline method is the method of completing it as the outline on a body by transforming a border-line model so that a border-line model (initial outline: it is equivalent to an auxiliary border line in this example.) may be given and the energy performance index which meant as a constraint that it was on that an outline configuration is smooth and an edge etc. may serve as min.

[0112] Since outline coincidence of an auxiliary border line and the border line of the photographic subject which should be extracted can be automatically carried out by changing the size about an auxiliary border line etc. based on image pick-up conditions, the photographic subject field by the complexity of the image pattern for a background and the complexity of a photographic subject configuration which should be changed ** can be extracted to a high speed and stability.

[0113] Thus, after extracting the field inside the border line (closed curve) obtained automatically as a photographic subject field, in a photographic subject field, '1' and binary mask data which are set to '0' except [its] are generated. Image transformation equipment 238 performs transform processing according to conversion photography mode to the image belonging to a mask field (for example, a mask value is the field of '1') (S48).

[0114] For example, when bloodshot-eyes amendment mode is set up as photography mode, bloodshot-eyes amendment processing is performed to the pixel of the red component of the extracted field. As shown in drawing 15 , it searches for the pixel which contains many red components which are specific colors in a mask field (S61), and, specifically, the connection field is extracted (S62). And it is a field contiguous to the connection field, a representation color component is extracted from the set of the pixel which is within the limits of planned color components, such as black or tea, (S63), and the color

component value of the corresponding pixel is changed into representation colors (black etc.) (S64). It is the pixel which does not define beforehand the color component value permitted as a representation color, but is near the corresponding pixel, and although it has the color component value of non-red and non-white, color component values (for example, brown, blue, or a golden component etc.) may be used. You may change uniformly so that it may have the color component value beforehand set up in the red component pixel in a mask field, without extracting a connection field.

[0115] bloodshot-eyes amendment mode and silverfish -- an example of the automatic processing (it corresponds to extract processing of the field which should be pinpointed by S47 of drawing 13 .) which can pinpoint the field for the transducer used in common with freckle removal mode, mustached removal mode, etc. is explained with reference to drawing 16 . Here, an auxiliary border line shall be given as a target border-line model which should be changed, and as mentioned above, based on image pick-up conditions, such as a scale factor and photographic subject distance, a scaling shall be made beforehand.

[0116] First, the point which corresponds as the focus of a border-line model to one of classification, such as the point of inflection, a corner, and the curvature maximum point, is extracted (S71), and each classification and location are recorded. This data may be beforehand given as incidental data of a border-line model.

[0117] The edge intensity distribution of an input image are searched for by filtering accompanied by space derivation, such as Sobel, Prewitt, or Canny, (S72). The acquired edge intensity distribution are made binary with a predetermined threshold, processing of the maximum location trace of thinning or edge intensity distribution etc. is added if needed, and border-line data is extracted (S73).

[0118] The focus (and the classification) is detected like model data from the extracted border line (S74), between the focus between both border-lines data is matched (S75), and the location gap vector between corresponding points is extracted (S76). Since this location gap vector gives the relative displacement centering on a center of gravity, that amount of offset is made to serve as zero, and it normalizes (S76).

[0119] The displacement corresponding to location gap vector quantity is given to each focus (S77), spline interpolation etc. generates the curve which connects between the focus adjoined after migration, and a border-line model is transformed (S78).

[0120] It cannot be overemphasized that matching between curves is not limited to the method mentioned above, and other methods may be used.

[0121] Thus, it is the pinpointed field which is obtained and where the field inside the border line (closed curve) of the border-line model which deformed is set as the object of image transformation. Furthermore, you may amend using other technique, such as a dynamic outline method, if needed. Desired image transformation is automatically performed to a photography image (output image of an image sensor 214) ** [according to / the complexity of the configuration of a portion to be changed etc.] by above-mentioned matching processing and pinpointing of a deformation field.

[0122] After above photographic subject field extracts and image transformation processings, a coding network 232 carries out compression coding of the image after conversion (S50), and records on a record medium 230 (S51). The image output signal generating circuit 234 generates and outputs video signals (NTSC system or PAL system) from the image after conversion simultaneous in be fastidious (S52).

[0123] In the graphics format outputted from a coding network 232, incidental information, such as image pick-up conditions, photography time, compressibility, and a compression method, is recorded on a header or the incidental information data file created separately by the existence of activation of image

transformation, conversion photography mode, a conversion location, auxiliary border-line data, and the list if needed, for example. An example of the expression method about the record format of these items is shown in drawing 17 .

[0124] Incidental information may record on an image that it cannot perceive visually as electronic watermark data (Proc of the IEEE, vol.83, pp.944-957.1995). For example, the least significant bit showing image data is assigned as a write-in bit of these data, and there are methods, such as embedding into the edge portion in an image. In this case, especially the border line for a transducer can be superimposed and recorded on image data.

[0125] In this example, photographic subject image 242c used as the photographic subject 252 of drawing 14 and the model for an extract does not necessarily need to be in agreement. It is because it can ask for the border line of a right photographic subject by a dynamic outline method etc.

[0126] Although image transformation was performed to the extracted object domain in this example, it cannot be overemphasized that image transformation may be carried out to reverse at a part for the background. This is the same also about the following examples.

[0127] With the configuration shown in drawing 12 , image pick-up conditions, image data, a model border line, etc. may be supplied to the photographic subject extract circuit 236 after photography, image pick-up conditions may be utilized, and image transformation which asked for and mentioned the conversion field above may be performed. In this case, image-processing section 210b separated from main part 210a is realizable by computer. The function of the photographic subject extract circuit 236 and the image transformation circuit 238 is realized by the program of the procedure shown in drawing 13 , drawing 15 , etc.

[0128] Next, the example which performs geometric transform processing or substitute processing to the predetermined image portion set up or extracted by the method shown in the above-mentioned example to the input image is explained. The flow chart of an overall procedure is shown in drawing 18 . Drawing 18 is the same as the processing flow fundamentally shown in drawing drawing 13 except for a setup in conversion photography mode.

[0129] the target transform processing (S89 of drawing 18) be substitute processing to the parts image data by which each part be beforehand prepared for deformation of each part, such as processing which fatten or dwindle an image field about the parts (an arm, leg, etc.) of for example, hairstyle conversion, mustached addition conversion, facial form conversion, portrait-izing, a face, or the body or all the bodies, an eye which be the component of a face, a nose, and opening, or modification of the geometry between each part, and a list etc.

[0130] In this example, the type which set up conversion photography mode (S81), and set up that degree after that with the classification of conversion which was mentioned above, or was further subdivided of the same conversion categories is chosen (S82).

[0131] The photographic subject field used as the candidate for conversion is extracted (S88), and transform processing which suits the configuration for conversion well is performed after that using the size of image pick-up conditions or an extract field etc. (S89).

[0132] A mustached addition translation mode is the so-called processing which carries out texture mapping (see the "ray-tracing" Ohm-Sha ** written by Shin-ichi Takemura) about the image data of the preselected mustache in the predetermined location of the face in an image. An example of a selection screen mustached type when the conversion photography mode of mustached addition is set as drawing

19 is shown. A list of the mustached image according to type is displayed, and a user chooses one of them using the directions selecting arrangement 240. For example, the frame which surrounds an image using a cross-joint key is moved, and a non-illustrated confirmation button is pushed and chosen. The input image is displayed on the subwindow at the lower right of a screen. If the 'following' carbon button displayed on a screen is pushed after choosing a mustached type, as shown in drawing 20 , a processing result will be displayed on a display. When a user pushes a confirmation button etc., finally conversion photography (the video signal of an resolution picture is outputted [encoding an resolution picture and recording on a record medium] to the exterior) is completed. The texture data of a mustached image is performed as mustached texture mapping is mapped by suitable size and a suitable location using the configuration of a formula (2) and an extract field.

[0133] In a facial form translation mode, so-called morphing or substitute between the face image data which should serve as a face image in an input image and a target etc. is performed. Facial form conversion is automatically performed using the model which consists of a partial feature element indicated by JP,7-320086,A by the same applicant as this application by taking correspondence between each part articles (an eye, a nose, opening, etc.) of the face of an input image and a target image. In this case, as the above-mentioned example explained, after the face image of a target is changed into suitable size by the automatic scaling based on image pick-up conditions, processing of morphing, substitute, etc. is performed.

[0134] the sketch model data (being the so-called --) of the face currently beforehand prepared in the portrait-ized mode after detecting a face field Carry out an automatic scaling, as the template model was explained previously, and correspondence is taken between the edge intensity distribution of the face field of an input image, and the components of the face of a sketch model. Furthermore, the movement magnitude from the model data of the arrangement between components (each center-of-gravity location etc.) and the deformation of each part article are amplified to linearity or non-linearity, and the fixtures of a face are exaggerated. Thereby, the line drawing image of the portrait-ized face is generated.

[0135] In the above transform processing, in order to detect the location of conversion object domains (face field etc.) The model border-line data (face etc.) for conversion is inputted from storage the same with having explained with reference to drawing 13 or subsequent ones. What is necessary is to scan in an image what changed this into suitable size using image pick-up conditions by the formula (2) etc., and just to ask for the location where a correlation value with the border line for which it asked from the edge intensity distribution of an input image serves as max (or maximum).

[0136] An example of the processing flow which generalized pretreatment of these transform processing is shown in drawing 21 . A template model is changed into suitable size based on image pick-up conditions (a scale factor, photographic subject distance, the direction of a look, etc.) (S101), and point of inflection, a corner, the curvature maximum point, etc. on the border-line data are extracted as the focus of a template model, or focus data is read from storage as incidental information on template model data (S102). The edge intensity distribution of an input image are extracted (S103), binary-izing, a border-line extract, etc. are performed (S104), and the focus extracted with the template model and the same focus are searched for and extracted (S105).

[0137] Between the focus is matched (S106). Thereby, between the components which constitute faces, such as an eye, a nose, and opening, can be matched. That is, since the center-of-gravity location and size on the image of a template model are beforehand set up appropriately based on image pick-up conditions

etc., they can search for and detect the focus which corresponds in the near range for every focus in an input image for every focus on each part articles (an eye, a nose, opening, etc.) in a template model.

[0138] The location gap vector between corresponding points is extracted, and it normalizes on the basis of a center-of-gravity location (S107). Various image transformation is performed based on this result (S108).

[0139] A face field makes it become thin (making it grow fat), and deformation processing of conversion object domains (face image field etc.) is explained to an example for processing. A face makes it become thin and processing is variable power conversion (affine transformation) to which longitudinal magnification sets lateral magnification to a (it is 0< a<1 here) to 1 about the field inside a border line. It is made to grow fat and is set to a> 1 in processing.

[0140] After the location (reference point locations, such as a center of gravity) of a face field is detected, it asks by the method of showing the border line in drawing 16 . A face dwindles drawing 22 and it shows an example before and behind conversion of processing. It is made to become thin and a crevice occurs between parts for the face worn thin and a background in conversion photography. The image data of this gap portion is the following, and is made and generated. That is, the color component value or texture pattern of image data for a background which adjoins each border line of the face field in the original image is extracted, and the color component value of the adjoining portion is given to the pixel of an applicable portion, or the texture pattern of an adjoining field is mapped. The image of the whole background is photoed beforehand and the corresponding background image may replace a gap portion.

[0141] it is made to grow fat and a conversion object domain is **** in the background region of the original image data at processing at reverse -- what is necessary is just to interpolate the image data inside the border line of the field after conversion by the affine transformation image data of the original portion for conversion, although it becomes ******

[0142] When replacing by other face images as other transform processing While other target images changed into the template size set up as the image field for conversion was mentioned above replace A face dwindles fields, such as a gap portion (refer to drawing 22 (2)) produced when a configuration is not in agreement, and background-image data is inserted in them by extrapolation of texture mapping or a color component etc. like the case of processing.

[0143] In performing portrait-ization, while being able to give and predetermined-maximum-amplify the rate of exaggeration showing the degree of exaggeration of the location gap vector between the extracted each part articles, it divides (inch-between), and transforms the border-line data of the original template model by linearity extrapolation, such as law. For example, based on the template model which consists of a partial feature element indicated by JP,7-320086,A by the same applicant as this application, it asks for the new location of each focus of each partial feature element by linearity extrapolation, and the curve which ties smoothly the new partial feature element obtained as a result is generated. Thereby, the portrait-ized face image is called for.

[0144] It can save with the border-line data of the object domain after also changing the original image data of the field used as the candidate for conversion on the occasion of coding and record of the image after conversion. Thereby, when required later, processors, such as a computer, can be used and the original image data can be restored easily. The partial image of the object domain before changing into a file separate from the image data file after conversion as the record gestalt may be recorded, or you may record on a part for the header unit of the image data file after conversion. In generating the partial

image data file before conversion, it records the image data file name after changing into the header unit etc.

[0145] The background image is photoed beforehand, the target field is extracted based on the difference of the background image and the input image containing the candidate for conversion, and it may be made to perform image transformation which a user specifies as the field. Here, image pick-up equipment shall be used by the stock photography which is not fixed to a tripod etc., and makes it a prerequisite for a focus to differ from exposure conditions etc. in the time of background-image photography and the input image photography including a photographic subject. a pin -- and/or, processing becomes easier when exposure conditions are in agreement.

[0146] The extract of an object domain and the flow chart of a transform-processing process are shown in a photography actuation list at drawing 23 .

[0147] A background image is photoed (S111), the image pick-up conditions at this time are extracted (S125), and it memorizes to storage 220 etc. Conversion photography mode is set up (S112) and conversion targets (a hairstyle, a mustache type, facial form, etc.) and the degree of conversion are specified if needed (S113). A photographic subject image (input image in a previous example) is photoed (S114), the image pick-up conditions at this time are also extracted (S126), and it memorizes to storage 220.

[0148] Then, in order to extract the corresponding points between a background image and an input image (S115) and to remove the effect of stock photography therefore the rotation to produce, a parallel displacement, scale-factor fluctuation, etc., the geometric conversion parameter (affine transformation or transparent transformation parameter) of the background image in consideration of the difference among the image pick-up conditions between corresponding-points extract data and an image is presumed and extracted (S116). By taking into consideration the difference among image pick-up conditions, the incorrect correspondence in corresponding-points extract processing is removed, and geometric conversion in a high precision is enabled (S117).

[0149] It asks for a gray-scale-conversion parameter in consideration of a difference of image pick-up conditions, such as a pixel value between corresponding points and exposure conditions, and the gradation of a background image is changed (S118). Specifically with reference to the pixel values between corresponding points (RGB each color component value etc.), the pixel value translation table from a background image to the corresponding points of an input image to each gradation in 0 to 255 level is presumed. In consideration of photography conditions (exposure conditions etc.), much more high-degree-of-accuracy-ization can be attained by eliminating the pixel value data of incongruent corresponding points in the amount of fluctuation of image pick-up conditions clearly in that case.

[0150] Thus, the difference of the background image and input image which were changed is taken, and a photographic subject field is extracted by processing of making it binary with a predetermined threshold (S119). Since future processings are the same as the case of drawing 18 , detailed explanation is omitted.

[0151]

[Effect of the Invention] As explained above, according to this invention, in a set photograph, a commemorative photo, or a catalog photograph, the natural synthetic image into which the person or body which does not exist on that occasion was put is set by the composition and the photography conditions of a site, and simple actuation generates it, and it can be recorded in a photography site.

[0152] By using the auxiliary border line about a configuration, size, etc. of a photographic subject which

were recorded beforehand, if it is the same background, photographic subject extract and synthetic image generation can be automatically performed only by using the image in an auxiliary border line.

[0153] When removal of an unnecessary person or an unnecessary body is not depended on the complexity of the configuration, either but photos the image of only a background, it can remove easily and fitting for the background equivalent to the portion after removal can be performed by simple actuation.

[0154] According to this invention, moreover, the main photographic subject image portion which has the configuration of arbitration in an image input means by using image pick-up conditions at the time of an image pick-up (at the time of an image input) or the background-image portion except the main photographic subject Specify with a sufficient precision, without being influenced by an image pattern, lighting conditions, etc. of a background, the automatic (semi-automatic) conversion photography which performs conversion or processing processing of arbitration to an applicable portion is attained, and the image which performed such conversion can be recorded or transmitted.

[0155] Moreover, since a model border line can be set as the suitable location in an image with reference to photography conditions, a high speed and the field of a portion which is automatic and serves as a candidate for conversion can be extracted from an image, and desired conversion photography can be performed.

[Translation done.]

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Outline configuration block drawing of the 1st example of this invention is shown.

[Drawing 2] It is the flow chart of the extract of a photographic subject, and a synthetic process with a background image.

[Drawing 3] The example of the display screen of the display display 24 is shown.

[Drawing 4] It is the synthetic example which detached and added a little same photographic subject image.

[Drawing 5] It is another flow chart of synthetic processing of this example.

[Drawing 6] It is another example of a screen of this example.

[Drawing 7] It is outline configuration block drawing of the 2nd example of this invention.

[Drawing 8] It is the operation flow chart of the example shown in drawing 7 .

[Drawing 9] It is the example of a screen which enabled it to adjust gradation and/or a color tone by the manual.

[Drawing 10] It is an example of a screen possessing the auxiliary outline display carbon button 154.

[Drawing 11] It is outline configuration block drawing of the 3rd example of this invention.

[Drawing 12] It is outline configuration block drawing of the example of modification of the 3rd example.

[Drawing 13] It is the flow chart which shows the procedure of the conversion photography processing in the 3rd example.

[Drawing 14] It is an example of the display screen in the 3rd example.

[Drawing 15] It is the flow chart of the image transformation processing in the 3rd example.

[Drawing 16] It is the flow chart of the photographic subject field automatic extracting processing in the 3rd example.

[Drawing 17] It is the example of an expression of the image recording format in the 3rd example.

[Drawing 18] It is another flow chart of image transformation processing.

[Drawing 19] The selection-menu display screen at the time of mustached addition conversion photography

[Drawing 20] It is an example of an image after mustached addition conversion.

[Drawing 21] It is the flow chart of pretreatment of the image transformation shown in drawing 18 .

[Drawing 22] It is made to become thin and is an example of the photographic subject image before and behind conversion of conversion photography.

[Drawing 23] It is still more nearly another flow chart of image transformation processing.

[Description of Notations]

10: Image pick-up image processing system

12: Image formation optical system

14: Image sensor

16: Measurement control circuit

18: Video signal processing circuit

20: Storage

22: Control signal generating circuit

24: Display display

26: Directions selecting arrangement

28: Stroboscope luminescence equipment

30: Record medium

32: Image coding network

34: Image output circuit

36: Photographic subject extract circuit

38: Image composition circuit

40a, 40b, 40c: Photographic subject image display field

42: Synthetic image display field

44: Expansion carbon button

46: Contraction carbon button

48: Navigation key

50a: Return key

50b: Delivery key

52: Auxiliary frame

54: Rectangle frame

140: Record medium

142: Communications control circuit

144: Image data format conversion circuit

150: The slide bar for lightness conversion (or carbon button)

152: The slide bar for saturation conversion (or carbon button)

154: Auxiliary outline display carbon button

156: Auxiliary border line

158: The photographic subject image surrounded by the auxiliary border line 156

210: Image pick-up image processing system

210a: Main part

210b: Image-processing section

212: Image formation optical system

214: Image sensor

216: Measurement control circuit

218: Video signal processing circuit

220: Storage

222: Control circuit

224,224b: Display display
226: Directions selecting arrangement
228: Stroboscope luminescence equipment
230: Record medium
232: Image coding network
234: Image output circuit
236: Photographic subject extract circuit
238: Image transformation circuit
240: Photography mode setting equipment
242a, 242b, 242c: The model for an extract
244: Arrow key
246: Delivery / return key
248: The carbon button for an auxiliary outline display
250: Auxiliary border line
252: Photographic subject

[Translation done.]